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Science in Public Affairs

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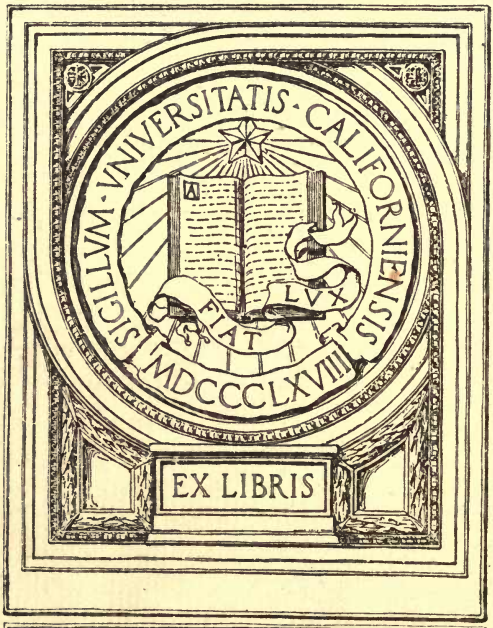

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Science in Public Affairs

Science in Public Affairs

WITH PREFACE BY

RIGHT HON. R. B. HALDANE

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Edited by

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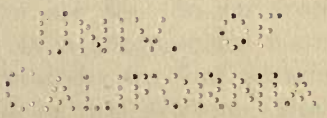
(*Editor of "Ideals of Science and Faith," etc.*)



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PREFACE

TEN years ago the volume to which I write a few words of preface would have excited a smile. Its authors would have been dubbed "idealist," "abstract-minded," or, perchance, "professional." Even the more intelligent of the public would have declared with confidence that we could at least muddle through without the trouble of such preliminary thought as is insisted on in the pages which follow. To-day it is otherwise. We have, as a nation, been awakened from our dogmatic slumber. We are becoming conscious of keen competitors for the place of supremacy, which we have so long held. We see around us rivals, in many points as well, and in others even better equipped than are we. So far from possessing such science as is adequate for the needs of our commercial position, we find ourselves at every turn deficient in that science. And yet to-day science is essential to victory, whether the struggle be in the arts of war or in those of peace. Organisation is the key to success; organisation depends on steady thinking, and thinking depends on ideas, ideas which give birth to ideals. For inspiration, as well as guidance, those engaged in enterprise of every kind look more and more to

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the trained mind. They are forced to do so. If transactions are much greater than used to be the case, the margin of profit is much smaller. Slight errors give rise to colossal shortages where the volume of business is measured by millions instead of the thousands of our forefathers. We are learning the necessity of clear thinking at the start. The modern cost sheet in industrial enterprise, the chemical knowledge which is essential if waste products are to be recovered and utilised, the separation of command and organisation in war from supply and administrative details, and the resulting establishment of the general staff—all these are but illustrations of the great lesson of the new era on which we are entering. We are learning that nothing can be accomplished on a large scale without the indispensable preliminary of first taking thought. And we are learning that the taking of thought requires at every turn, not only the expert, but the highest type of expert knowledge. Everywhere there is manifest a disposition to pay for brain power, if only brain power of sufficient quality is to be bought. The joint-stock company system has relegated the private capitalist, who is a mere owner of capital, to a comparatively feeble position. On the brain worker the iron law of wages does not press, because it turns out to be no true law. The market value of exceptional talent is steadily rising, because there is monopoly of the capital which that talent requires as its instrument. Never before in the history of the world was such a career open to that talent. And so we see a new estimate

being made on every side of the value to be attached to it. "Educate, educate, educate," is the cry heard on all sides.

What is true of Commerce and Industry is not less true of the Art of Government. This art is founded on science. Where the clear conceptions which science alone can give are absent, confusion is the result. People hardly know yet how much this is being realised. Our best reformers in such subjects as Poor Law Administration, in Education, in Local Government, in the region which belongs to the Labour and Commercial sides of the Board of Trade, in Public Health, and, last but not least, in Railway Administration, are yearly insisting more loudly on the necessity of the trained mind. Things are, as a consequence, rapidly ceasing to be what they where.

The meaning of the change which is taking place is the subject of this volume.

It speaks for itself, and its tone and line of thought needs no defence from me. For the individual opinions it contains I am not responsible. None the less, I am wholly in accord with the spirit which pervades the book, and in the ideals which it seeks to set forth.

R. B. HALDANE.

March 7, 1906.

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INTRODUCTION

IN a recent volume entitled "Ideals of Science and Faith," the editor had the satisfaction of bringing together a group of thoughtful writers, each representing some well-marked standpoint, and stating it with personal vigour, with fresh and independent yet convergent thought. The reception of these essays has been such as not only amply to justify their preparation, but to bring out very clearly that there is also place and need for kindred discussions of the great and growing place and influence of science throughout all departments of life. It has, of course, long been obvious enough that the progress of our knowledge of the order of nature brings with it corresponding advances in our control and command of her resources and powers, and also that empirical progress and inventions, even in the homeliest and humblest arts, may react profoundly upon our theories of the Universe. But though in general terms these ideas may be but truisms, their particular applications have an ever-renewing force and freshness, and they are thus not only open to periodic restatements, but positively require them. But science does not merely transform

our material life in detail with its mechanical and electrical appliances, its agricultural advances and the rest; each of these reacts upon the others, and combines with them, and in their resultant they are transforming the whole complexion of society. As even the hewing of fuel and the drawing of water have passed from being a matter of slaves' hands to one primarily of engineer's head, as the crude routine of food-winning from the soil ceases to degenerate into unthinking drudgery and becomes a matter of the ever subtler and skilfuller co-ordination of a score of arts and sciences, so the whole function of society is changing also. With this its structure is also in process of metamorphosis; it is not enough then to take note of the advances of discoveries and inventions; it is needful to ask, and in some measure to answer,—How are these advances affecting us in more general ways? The world-transforming influences of improved communications is the well-worn example of this: yet whether we reflect upon the influence of railways and steamers upon the past generation, upon those of electric tramways and automobiles at present so distinctly making themselves felt, or upon the possibilities of turbine steamers or air-ships in the future, we feel the interest and see the necessity of discussing even this matter of communications anew, and from the beginning. In such ways appears the need for a whole group of discussions,—what of science in agriculture?—in handicrafts and manufactures?—in communications as aforesaid?—in commerce

and business affairs generally, from market-stall to bank and finance ministry? And what, therefore, of the statistics which should record the accountancy which should criticise the whole of these activities? What of our coal supply, and of our national energies generally,—stored but diminishing like coal, or passing yet ever renewed like wind and stream and tide? What, too, of our human energies? Even from our professedly mechanical standpoint, much less any other, do we make the most of these?

Nor are the fine arts exempted from this all-penetrating influence. Even architecture is less conservative than it appears: and the graphic arts frankly admit their direct relation to scientific advances, the subtlest impressionist no less than the simplest photographer recognising his indebtedness to the progress of optical science, so that Chevreul with his complementary colours and Monet with his lyrical variations upon light stand side by side in history. In the apparently cloistered art of sculpture the same parallelism holds good. Rodin's mighty *penseur* might have been wrought as the symbol of the doctrine now so fruitful both in psychology and education, that thought is no insulated brain-malady of the physically less fit, as even Huxley seems to have viewed it, but the highest expression of motor experience, and thought being more full than we know, the very nerve of action. Literature and criticism are everywhere becoming sociological; and in this movement the drama leads. Even music, as ever,

renews its themes and carries onward its witchery from old romance into present ideals.

But enough of this world of æsthetics and its cultivated senses. What of the general life? what of the medical and biological sciences which deal with this? That the study of microscopic germs has yielded a transformation at one time of whole industries, at another of medicine, and again of surgery, are matters of common knowledge, doubtless; yet is the common knowledge sufficient? With all advances of application, are the conditions of industry yet adequate? Is the production of wealth or the production of health yet anything like what, with even our present imperfect knowledge, it might be? We boast our lead in the colonial world,[1] our expansion into the vastest of historic empires, yet though science has lately given us a new control of health conditions throughout the tropics, is it not notorious that we are lagging behind other peoples in applying these to the countries we govern, to the very towns to which our countrymen go out to die? Why? Because our rulers and our public alike are at this moment, in average and in majority, less conversant with the results of the sciences and less influenced by its methods and spirit than are Frenchmen or Germans, Americans or Japanese, less probably than are the members of any of the small nationalities of Western Europe,

[1] Ronald Ross (on his malaria mosquito researches and the encouragement and application of them even by Colonial Office) in the *University Review*, vol. i., No. 1, May 1905.

perhaps not much more than some of the peoples upon whose backwardness we are wont to descant most freely.

Hence, then, a new group of discussions is inevitable and urgent; that of science in life. What of science in diet and in temperance? What of science in the home as well as in the mine and factory and railroad? What of the conditions and life-expectations of the labourer—these no less than of the inventions for increasing his day's output? What, then, of eugenics? Or, in simple phrase, what of the child? What of the mother? of the father also? What of public health as a whole, and this not only on the elementary plane of water and drains, but of air, of light as well—nay, of the whole environment, of civic beauty therefore, of access to nature? What of the old country life? How far is this again possible to-day? What of our present cities? what is to be their future?

That we, none of us, can adequately answer such questions is obvious, but it is all the more urgent that we, who in the past hundred years have changed from one of the most rustic of civilised peoples to the most preponderatingly urban, should waste less time than we are doing in putting ourselves in the way of clearly asking them.

In such matters of the physical and biological sciences we are, it is true, recognising our backwardness. But what is to be the place of science in education? We can no longer simply set up

a chemical laboratory, or, more lately, a "nature-study" flower-pot or aquarium over against the Classical School, and advertise this as our "Modern Side"; nor can we drop out knowledge of the past of civilisation and ideals—knowledge of history and of literature, of art and music, and call the piteous skeletons of residual information by the great name of "Science," as the last Romanes lecturer too much appears to do—so inviting repressive reprisals from the old-fashioned believers in "humanities," as water-tight to science. Here again the education of other peoples has been outrunning ours. In the Danish folk-school or in the Japanese university the noblest and the most inspiring traditions of nation and of humanity, the latest scientific discoveries and technical methods are taught side by side. Science and the humanities, here divorced by absurd school and degree curricula, are there kept apart no longer; and whatever don or examiner, professor or specialist may decide, the more thinking student's outlook among ourselves must ever seek to comprehend man as inseparable from his past and from his world, the world too as inseparable from man. But this is a reunification of culture; it involves a reconciliation of ideals which for too many of us are still as divergent as ever seemed those of science and faith. If this reconciliation of man and nature, classics and science, sociology and geography, is to be a real one, its various aspects and approaches need no less careful discussions.

What, then, is to be the place of science as regards the matter of education, and how can she help us in the manner of it? The questions in themselves are old enough: but the answer to the first raises all the problems of the nature, method, and classification of the sciences, and, indeed, of their necessarily associated arts also; while the answer to the other demands that developmental psychology of the child, of the adolescent, of the sexes, which is happily now everywhere nascent, that subtler individual psychology also, which is here and there renewing its youth. In such ways, then, the teacher with his demand for correlation and gradation of studies, the psychologist, even the philosopher with his system of knowledge, begin to draw together and to revolt against the self-styled "practical man," with his crudely abstract talk of "utility," against the bureaucrat with his pretentious fetishes and fictions of "My Lords," with their "forms" and "codes," each concealing beneath its superficial show of method and orderliness a hash of half-decayed thought. Coming to details, there arises a fresh group of discussions no less numerous than before. What of science in our schools and universities, from kindergarten to research laboratories, and beyond? What of professional education, old and new—that is, not only of the medical, legal, and clerical faculties, but of the teacher, the engineer, the artist also? What of popular education? and what of general culture? and what of the better organisation of the whole?

Are we, as is becoming our wont in public affairs, in education, before improving our method, to go on "completing our organisation" first, and afterwards, when all is bungled, to begin tardily to have an "inquiry" by royal commission or otherwise? Is it not of the very essence of science to have its inquiry first? And if so, is the reversed method of the bureaucratic mind in any way distinguishable from invincible ignorance?

Here evidently we come very near the crux of fresh questionings. What is, and what should be the place of science in social life? What in public affairs? The current glib explanations of the present breakdown of the traditional regime in Russia as that of an old-world autocracy stand in much need of complementing; for this social organisation which has collapsed is in a large measure that to which we and all western peoples are tending, and in which Russia has not lagged, but in large measure led, the rule of the administrator; for the terrible "Russian bureaucrat" is no mere bogey, but corresponds, much more than we commonly realise, to one of our own government clerks or education officials; indeed, so far from being merely backward, as we too often suppose, he is conversant with modern thought, both in its material and its psychological side, to a degree which would surprise many of us. No doubt, the ways of French or German functionaries may strike us as something stiff and hard beside our own easy-going Civil Servants, that of Austria as more wooden than either, while Russian

bureaucratic rule may have become many times harsher than all these. But this is only to say that Napoleon was before Palmerston, Gladstone, or Chamberlain; Joseph II. before Napoleon; Peter the Great before all. Is not the essential weakness, the strength doubtless also of governments everywhere, that they present, not any really vital social structure, but in ministry after ministry, each but a mass of scaffoldings, which come to impede life instead of supporting it. In fact, at best—and at worst also—do they not date from the eighteenth century period of social reconstruction on abstract and philosophical grounds? And were not these substantially apart from the scientific and industrial progress of the later eighteenth century, from the developments of these in the nineteenth, from their ideals and potentialities in the twentieth? Here, then, is the reason why men are breaking away from the orthodoxies of Liberal and Conservative alike; hence, too, the unsparing criticism, the still uncertain reconstruction of the dreaded "intellectuals" of France or Russia.

Despite the education of physical health and courage, upon which we congratulate ourselves (and not indeed without some justice), are we not too prone to lack intellectual courage, and, before questions of this sort, to stick our heads in the sand; "Science"—evidently something unsettling! Our grandfathers got on very well without it—was not the battle of Waterloo won on the playing-fields of Eton? We may grant

for our grandfathers, whether they were at Eton or in the slums, that the only clear meaning they appear generally to have attached to "Science" was proficiency in batsmanship or pugilism. As the simplicity and strength of this conviction failed, the popular prestige of science diminished also; so that, for the mid-Victorian age, natural philosophy became at best a fashionable entertainment, with experiments at the Royal Institution; while "Biology" commonly stood for mesmeric charlatanism, and "Evolution," of course, was rank blasphemy. Our recent volume on the "Ideals of Science and Faith," already referred to, may serve as witness of how fully if not how far these days are past and gone; yet the recent foundation of a Sociological Society in the country of Adam Smith and Herbert Spencer has only too often brought out the fact that there are still many good people, not otherwise crassly ignorant, who confuse and ban Sociology with Socialism, exactly as H.M. the Sultan is said lately to have insisted on prohibiting the importation of "dynamos," since these to him came obviously under the category of "dynamite." That the reasoned anarchism of a Reclus or Kropotkin is to be considered and treated simply as an appeal to vulgar violence will doubtless still remain for some time the initial difficulty in the press man's or politician's endeavours to cope with it; but surely the scholar is but a belated one, who, after fifty years of naturalisation in all European languages, hears words like "Sociology" or "Altruism" and

still protests against the first as "a hybrid word," and therefore, presumably, "a pseudo-science," or plaintively asks the meaning of the second. That the countrymen of Spencer are now the latest in the world, even generally, to know the meaning of "synthesis," much less to see the need for any, is at this moment clear to all other peoples, literally from Japan (if not even China) to Peru.

It is time, then, to be discussing the place of Science, ideal or other, and this not only in thought but in affairs. We have heard much of "efficiency" of late years; some even begin to consider how we are to get it; we even begin to take this and that measure in hopes of obtaining it—witness the praiseworthy initiative of what seems at present our foremost group of Educationists—financier, peer, bureaucrat and barrister—to enlarge the school of mines in Piccadilly into a Charlottenburg at South Kensington. It is something to be informed of the scientific ideals of Germany, especially by any who may have informed themselves less than a century ago; and it may be necessary for us to excavate the vastest labyrinth of specialist laboratories beneath the most confused of museums in order to justify the demand for some intelligible rearrangement of the whole, elsewhere.

But it is not yet the time for such a correlation of studies, such reorganisation of culture, such University of the future. Our Universities must still linger for a season upon their various

compromises of mediæval survivals and renaissance decline with encyclopædic specialisms, and with steeplechase barriers of examinations which postpone or inhibit even the prosecution of these. Pending the evolution of more vital educational methods which may treat science in its synthetic aspect, and which may again carry deepened thought into broadened life, we may be discussing not only educational questions in detail, but also bringing science to bear upon the questions of social life, of politics and government—and this in all their branches. Legislation and administration; criminal justice and state administration; finance and taxation; questions of home and colonial development; questions of war, defensive and offensive—questions of internationalisation and peace we trust also—have all to be restudied from fresh standpoints, and for the most part, therefore, by fresh minds; and if we would freshen our own to take part in the fray, we must henceforth give larger place to questions such as this volume raises, of Science in Life and in Education, in Industry and Art, and, above all, in Public Affairs.

Our warmest thanks are due to Mr. Haldane, who has so willingly written the Preface to this volume, amidst the pressure of public work and the many claims upon his time and attention of a great government department.

Mr. V. V. Branford was unable to complete his article in consequence of being called to South

America. The article now printed is one read before the Manchester Sociological Society in November 1905, but which, however, had been originally intended for this volume.

J. E. HAND.

St. Mary's, Bryanston Square,
London, W.
March 1, 1906.

SCIENCE AND PHYSICAL DEVELOPMENT

C. H. DENYER, M.A., AND J. E. HAND

THIS volume is a plea for the application to public affairs of science, *i.e.* of systematic and ordered knowledge, and the first department to which such application is urged is that of the physical development of the people. But there is no distinct branch of science which can claim this as its own special sphere. The physical well-being of the nation cannot be entrusted to any one class of specialists. The aid of the medical man must be invoked, but a general practitioner will not suffice; there is need of the dietetist, of the public health officer, of the physiologist, the oculist, the aurist, and others. Further, the help of a statistician is needed, and an economist, and an educationist—in fact, representatives of every department of sociology. And when each man has given in his specific scientific contribution, there will remain the difficult task of co-ordinating all this knowledge so as to bring it to bear on the physical development of the race.

However difficult such a task may be, it is abundantly clear that the work badly needs doing—

how badly it must be one of the objects of this essay to show. For, verily, in this matter we have drifted too long. A lethargic public opinion muddles on from one mild sensation to another, and the nation's open sores call aloud for help, but in vain. A Committee reports on Physical Deterioration; politicians hungering for a party cry, or eager only to let sleeping dogs lie, and fanatics with some cure-all nostrum, eagerly catch up the Report, but its language is too mild for them. They find no grand and drastic reform proposed, only a number of remedies, minor in themselves, however cumulatively far-reaching. As a result, the Report is shelved. Yet the document is worthy of close and continued attention. Taken together with its immediate predecessor, the Report of the Royal Commission on Physical Training (Scotland), it covers most of the ground before us. From the study of both these documents, and perhaps still more from the manner in which they have been received, one fact is abundantly clear, that the wheels of social reform drag heavily for want of adequate driving-power.

It is no doubt disappointing to find that the great evils complained of cannot be cured by the "hi-presto" of a sweeping Act of Parliament, but there is some comfort in knowing that while politicians are rising early and sitting up late at Westminster, with little reaping to show for their much sowing, the press, the platform, the schoolmaster, and the still more potent influences of private example and precept, may speed the day when a

strong-limbed, clear-headed people shall look back in pity on the physical deterioration of a past generation.

Now the two blue-books referred to are the result of the application of the principle for which we plead, since they were produced by minds previously trained in public affairs and brought to bear upon a great mass of scientific and expert evidence. They are worthy, therefore, of a detailed examination.

Royal Commission on Physical Training

The Royal Commission on Physical Training (Scotland) was appointed in March 1902, and reported in March 1903. The Commissioners found that no reliable statistics were in existence to enable them to compare the present with the past, and thus to judge if the physique of Scottish children of to-day compared favourably or otherwise with their predecessors, but they caused a very careful examination to be made, in two typical centres, of 1200 school children, so chosen and grouped as to provide accurate statistics for future comparison, and to give a clear idea of the present physical condition of Scottish children. The Report of the examiners appointed to conduct this inquiry was the most important evidence laid before the Commissioners. The towns selected for comparison were Edinburgh and Aberdeen. The latter was chosen as fairly representing Scotland outside the larger towns, of which latter Edinburgh

served as the type. The results were a terrible indictment of the life of the people in great cities. An intimate connection between housing and health was established. In Aberdeen most of the children were drawn from three-roomed houses, in Edinburgh from two-roomed houses. In Aberdeen 0.5 per cent. of the children were in apparent poor health, in Edinburgh 19.17 per cent., and in both towns the proportion in bad health varied directly with the more or less crowded condition of the district from which the children were drawn. Along with bad housing came, as a rule, bad feeding. As effects and causes the two conditions were practically inseparable. The schools were all comparatively healthy buildings, and "race" differences were hardly felt. It was the home life that told its story in such figures as these :[1]—

Mental dullness : Aberdeen, 8.8 per cent. ; Edinburgh, 12.33 per cent.

Badly nourished : Aberdeen, 9 per cent. ; Edinburgh, 29.83 per cent.

The Edinburgh child is nearly 1½ ins. shorter and 5 lbs. lighter than the Aberdeen child, while the latter is nearly up to the British average, but is both shorter and lighter than the American. Height, weight, pallor, bad health, bad nutrition, want of alertness, and bad carriage, all alike told against the children of the capital, even as compared with those of Aberdeen, though these were by no means all that could be desired.

The Commissioners were not able to decide as

[1] p. 24.

to whether or not there was progressive deterioration of the inhabitants of the large towns of Great Britain. "It is enough," they say, "that there exists in Scotland an undeniable degeneration of individuals of the classes where food and environment are defective, which calls for attention and amelioration in obvious ways, one of which is a well-regulated system of physical training."

But it is when the Report proceeds to deal with the results of the surgical examination of these children that the figures become alarming. We find that in Aberdeen 30 per cent., and in Edinburgh 53 per cent. of the children were suffering from nose and throat disease, that 36 per cent. and 47 per cent. respectively had eye diseases, and 14 per cent. and 42 per cent. had defective hearing. There were also found among the children undergoing serious physical exercises cases of unexpected valvular heart disease and phthisis—cases not giving an appreciable percentage, but yet which probably in the aggregate number 2000 in Edinburgh and 700 in Aberdeen, all of which ought to be, though none were, receiving special treatment and care; while medical attention of a more general nature was needed for 16,000 ailing children at school in the two towns. Again, there were examined in Edinburgh altogether 597 children, and of these 553 showed some defect of the ears or throat. With such figures before them, it is not surprising that the Commissioners urge that no proper system of physical training can be enforced till provision

has been made for regular medical inspection of all school children. The mere existence of numerous cases of unsuspected but serious disease of heart and lungs would necessitate medical inspection, but what of the accumulated mass of suffering and incapacity which is involved in all these untended eyes, throats, and ears? Does it not seem waste of time and money to try to teach lessons to children whose first and crying need is for medical aid to enable them to see and hear?

Without medical inspection the facts remain unknown on which alone can any system of training be built up. Without it infectious diseases cannot be detected or their spread arrested. Without it defects which would suggest special or modified teaching do not come to light. Without it very many of the smaller ailments which could be cured by timely treatment develop into lifelong infirmities.

But it seems needless to prove further what is so obvious that since this Report was written the more important educational authorities have taken the matter in hand, and an Inter-Departmental Committee have just reported (November 1905) on the progress made in England. The expenditure required for medical inspection turns out to be very small, in no urban area more than a $\frac{1}{10}$d. rate, and the results have been very satisfactory, especially with respect to the detection and treatment of defects of eyesight, and to the prevention of the spread of infectious disease. "Diphtheria especially, it is stated, is now in several areas under such complete control that it

can be stopped in a few days." It remains for the system to be extended to the districts not yet provided for, for greater thoroughness and more unity of plan, and for means to be found to compel careless parents to give attention to, or procure treatment of, ailments or defects in their children to which attention has been called.

In dealing with the primary subject of their reference the Scottish Commissioners found great need of more, and especially of more systematised, physical training in every class of school, even including the Universities, where they discovered much injury to health due to hard reading for examinations unrelieved by proper exercise, for which the University authorities afford neither adequate opportunities nor facilities. To those of us who are familiar with the great English Public Schools and with Oxford or Cambridge this indictment of the Scottish Universities is rather a surprise. The leading Scottish Public Schools, such as Fettes and Loretto, are not behind Eton and Harrow in their zeal for athletics, and a certain minimum of football or cricket is made compulsory, but the system of living in private lodgings, which at Edinburgh and Glasgow takes the place of collegiate life, does not lend itself so easily to the development of athletic clubs. An exacting curriculum of studies allows little time for play, and it will be probably admitted that, partly from temperament and partly from poverty, the Scottish student reads harder and with more zest than his English fellow. But even in England

the evil is to be found. We can see at Oxford and Cambridge the undergraduate who reads too closely and injures his health thereby, and much more frequently the man who spends his hours of recreation in reading "sporting news," and cheering on his University or College eleven or eight, but who never plays himself. It is these sallow-faced lazy young men who need to be compelled to throw away their cigarettes, and, if they will not play, at least be put through a strict military training. And it is this mere looking-on at others playing, this striving for excitement rather than exercise, which brings together Saturday after Saturday, in each of the great centres of professional football, 20,000 to 40,000 men, of whom perhaps one-half ought to be either themselves playing the game, or as cadets or volunteers be developing health and strength, and at the same time rendering successful invasion impossible and compulsory conscription unnecessary.

In the Higher Class Scottish Schools the Commissioners report that opportunities for games are generally considerable, but urge that games and physical exercises should be treated as essential parts of the school course.

So too with the Elementary Schools, where it is hoped that improvement in physical training will follow from "a more intelligent conception of the proper aim of education; and larger provision of playgrounds and of exercise halls is necessary, and can in many cases be found without increased expense." In schools of this class

games are more difficult to organise, but the discipline as well as the health they bring make them invaluable, and the Report urges that use should be made of all available voluntary help. All this, of course, is as true of England as Scotland. Our towns greatly need playground space, and it would seem that few forms of voluntary effort bring a more immediate and abundant return than that given to organising swimming, football, and cricket clubs, boys' brigades, and cadet corps among boys from ten to seventeen or eighteen years of age. Much good work of this kind is done out of school hours by school teachers, and no doubt if the urgent need of helpers, and the ready response of the lads to such help were better known, many young men of other social ranks could be induced to come and help to teach the boys of England the games which have done so much to build up the English character. The Children's Happy Evenings Association has done something, but more is wanted than to teach little ones how to dance and play parlour games. The boys and girls both need friends who will organise clubs to play outdoor games in the school playgrounds and in public parks and open spaces, and if necessary the school curriculum might be so enlarged as to include such outdoor play within the limits of a compulsory attendance somewhat longer than that we now enforce.

Then comes the question of Continuation Classes. Here the Report mildly hints at attendance at physical exercises being made compulsory for lads

between fourteen and eighteen. We should have no hesitation in enforcing such attendance, and will return to this point later.

Physical exercises ought to be taught by teachers who have themselves been systematically trained. But in most cases both economy and efficiency suggest that the physical instruction should be given by the ordinary teaching staff. It follows that the members of this staff must be trained. This obvious truth has not always been grasped by either teachers or training colleges, and the Commissioners strongly recommend that steps be taken so that all teachers should have opportunities for obtaining certificates showing that they have received adequate physical training, and that such certificates should be part of the necessary qualifications for future appointments. We understand that this has now practically been done in England, where the chief Education Authorities always insist on such a certificate. The Report closes with an appreciative account of the work of Cadet Corps and Boys' Brigades. These latter institutions originated in Glasgow, and have spread all over England as well as Scotland, but so far only a small percentage of the available boys have yet been brought under their quasi-military and entirely salutary discipline.

Report of Committee on Physical Deterioration

A Report even more important than that of the Scottish Royal Commission is that of the

Inter-Departmental Committee on Physical Deterioration. This Committee was appointed in September 1903, and reported in July 1904. The original plan was that the Committee should make a preliminary inquiry to be followed up by a Royal Commission, but this scheme was subsequently abandoned, and the Committee was ordered to complete the inquiry itself.

Its starting-point was a memorandum, prepared by Sir William Taylor, the Director-General of the Army Medical Service, in which the Inspector-General for Recruiting is quoted as saying that "the one subject which causes anxiety in the future as regards recruiting is the gradual deterioration of the physique of the working classes from whom the bulk of the recruits must always be drawn,"—a statement which is illustrated, but not proved, by extracts from the Army recruiting statistics. A good deal of correspondence followed between the War Office, the Committee, and the Royal Colleges of Physicians and Surgeons. The conclusion seems to be that, in face of a declining general death-rate and with an almost total absence of other evidence, it is impossible to speak of "progressive physical deterioration" in the nation as a whole, and Sir William Taylor is perhaps right in regretting "that the words 'physical deterioration' have been adopted in the designation . . . of the Committee." "To my mind," he adds, "the principal question . . . is to inquire into the causes and present extent of the physical *unfitness* that undoubtedly exists in

large degree among certain classes of the population. . . . It is a most disturbing fact that from 40 to 60 per cent. of the men who present themselves for enlistment are found to be physically unfit for military service." [1]

It is doubtful if the Report quite justifies the alarmist language of Sir John Gorst in the *North American Review* of July 1905, but in the absence of reliable statistics it is at least as wise to sound a note of alarm as to take no news for good news, and fall asleep again, a favourite official method of procedure. However neither extreme is necessary, and we note in passing the Committee's opinion that "the impressions gathered from the great majority of the witnesses examined do not support the belief that there is any general progressive physical deterioration."

There can be little doubt that the nation ought to be able to know whether its physique is or is not improving. It can only obtain this knowledge from proper anthropometric statistics. It is impossible for these to be obtained on a sufficiently large scale by private inquirers, and the duty therefore devolves on the State. As the Committee says (p. 7): "What seems to be wanted is some permanent organisation, not necessarily on a large or expensive scale, which, under expert direction, and in collaboration with all the Departments of State concerned, shall be charged with the duty of collecting and tabulating facts which throw light upon the situation, and thus

[1] "Report of Committee," vol. i. p. 100.

provide means by which those interested in the subject may at any moment satisfy themselves of the progress of the nation one way or another. Every witness who was examined on the subject testified to the great value of such facts in determining questions relative to the physique of the people." There was also complete agreement that "anthropometric records were the only accredited tests available," and that there would be no difficulty in getting most of the measurements needed from the school population and the young people already subject to medical inspection under the Factory Acts. The Committee submit a practical scheme, suggested by Professor Cunningham, for carrying out the work, and it is earnestly to be hoped that an Anthropometric Bureau may before long find its home in London alongside the Registrar-General and the Geological Survey.

Causes of Physical Degeneration

The second and by far the larger part of the Report proceeds to examine in detail the causes of the physical degeneration which the Committee found "present in considerable classes of the community," and to suggest remedies. These remedies are as diverse as the social diseases for which they are prescribed. Some few would require the help of Parliament, more call for increased activity on the part of local governing bodies, but all alike depend for their efficacy on the support of an enlightened public opinion. If

only this lethargic many-headed giant would bestir itself, but little legislation would be needed, and that little would come almost automatically. It is to some of the heads of this giant force, to the thinking men and women who care for and study these things, who are prepared to alter their dinner-hour to attend a committee, to stay a "week-end" in town because their poorer brethren need them there, to lay aside a novel for such a book as this, it is to these we appeal, and these we would ask to consider with us the evils and their remedies.

It is not that things are going from bad to worse even in our large towns. As Dr. Eichholz says: "In the better districts of the towns there exist public elementary schools frequented by children not merely equal but often superior in physique and attainments to rural children." The combined influence of ameliorative and degenerative forces "has had the effect of stratifying the population and concentrating the classes that require special treatment." So that, to quote another witness, "Physical infirmity is practically confined to the poorest and lowest strata of the population, whose children are improperly and insufficiently fed and inadequately housed, and where parents are improvident, idle, and intemperate." But when we have reached these lowest strata the facts are unmistakable, and we have Dr. Eichholz saying again, "With regard to physical degeneracy, the children frequenting the poorer schools of London and the large towns

betray a most serious condition of affairs, calling for ameliorative and arrestive measures, the most impressive features being the apathy of parents as regards the school, the lack of parental care of the children, the poor physique, powers of endurance, and educational attainments of the children attending school." This applies only to the poorer schools, and the problem is how to arrest these evils without weakening the various influences already successfully at work in improving the physical status of the better children. A uniform level is undesirable and unattainable, the poorer will remain poorer and probably weaker, but they need not deteriorate. Even if more slowly, they too must be helped upwards.

The Committee refrained from making an estimate of the number of persons living "below the poverty line" on any such bases as have been adopted by Mr. Chas. Booth or Mr. Rowntree. They suggest that "the different estimates of the number of underfed children which they have had to consider seem to show that there must be some very variable element which interferes with the acceptance of such conclusions as resting on generally accepted data." They refer with approval to the trenchant criticism of the methods employed contained in Mr. Loch's Memorandum, which they print in the Appendix to their Report. The experience of the present writers in Poor Law and Police Court work shows the extreme difficulty of ascertaining the

total income of the family. We believe that this total was under-estimated by Mr. Booth in London and by Mr. Rowntree in York, and we do not think that dietetic science is yet far enough advanced to justify Mr. Rowntree's estimate of the minimum cost of living; but we must not be supposed for a moment to depreciate the enormous value of the work of these two inquirers, and it is only from their own high standard that we can presume to criticise them.

Urbanisation and its Results

In fifty years the urban population has risen from 50 per cent. to 77 per cent. of the whole, but it must be remembered that towns have now a death-rate lower than that of rural districts fifty years ago, and "that a large portion of the urban population is living under conditions as healthy as any that obtain in rural districts, and, indeed, enjoys superior advantages owing to the greater completeness of sanitary legislation for such areas, and the higher conception of duty that governs their administration." It is, however, the slum population to which we must attend, and here we find overcrowding with its attendant evils of uncleanliness, foul air, and bad sanitation.

Readers of this book require no statistics to prove the evils of overcrowding. Let it suffice that in 1903 in Finsbury the death-rate in one-roomed tenements was 38.9 per 1000; in tenements of four or more rooms only 5.6 per 1000.

The present writers have stated elsewhere[1] their belief that the solution of the problem is not to be found in clearing and rebuilding large areas by the municipality. They note that their views are endorsed by the Committee, who urge, in Mr. Booth's words, "that interference by administrative action and penalties at each point at which life falls below a minimum accepted standard is the way by which the problem must be approached, and the occupation of overcrowded tenements seems to afford the best opportunity for the application of the doctrine." "Surely the time is ripe for dealing drastically with a class powerless to extricate itself from conditions that constitute a grave menace to the community."[2] This drastic dealing should, they think, take the form of treating overcrowded houses as a nuisance, and fixing a date after which no one-roomed, two-roomed, or three-roomed tenements would be permitted to contain more than two, four, or six persons respectively. The present law is sufficient to enforce compulsory closing of tenements in case of non-compliance with these conditions, but, of course, the change should be introduced gradually. Most of the displaced persons would obtain accommodation under the ordinary conditions of supply and demand, and "in the last resort the State, acting in conjunction with the

[1] "Recent Progress in the Housing of the Poor" (C. H. Denyer); *Economic Journal*, vol. vii. pp. 487–502; "Good Citizenship," pp. 113–145 (J. E. Hand).

[2] Report, p. 17.

Local Authority, would have, for its own sake, to take charge of the lives of those who, from whatever cause, are incapable of independent existence up to the standard of decency which it imposes."[1] Similarly drastic treatment should be applied to vagrants, and we hope that this will be recommended by the Poor Law Commission now sitting. The present system of summer vagrancy and winter casual wards, alternating with short periods in prison, is wholly demoralising, and must give place to the compulsory detention, for long periods in labour colonies, of people who *will* not work, and perhaps of those who *can*not. It is difficult to say how far such colonies should be penal, but they must be made as far as possible self-supporting, and the difficulty of finding markets for their products in the face of interested "trade-union" and "trade" opposition to the open sale of "prison-made goods" must be boldly faced. And the treatment thus meted out to those who cannot live independently up to "the standard of decency" must be extended to those who beget children, but are proved unfit to discharge their parental obligations. The children must be saved and trained, and the parents pay for their training in cash or by labour in a labour colony.

From overcrowding the Committee pass to the pollution of the atmosphere of towns by smoke. This could largely be prevented by strict enforcement of the present law, and by an increase in the penalties inflicted on offenders, who now frequently

[1] Report, p. 18.

find it cheaper to pay fines and to go on sinning. The ordinary householder, too, might be brought under the law, as in Germany.

But all these public health questions depend upon the integrity, knowledge, and sense of duty, of local administrators. Except in London and Scotland the Medical Officer of Health holds office at the goodwill of the Local Authority. This is clearly wrong. He should be given security of tenure, unless convicted of misconduct. Members of Local Authorities are too often personally interested in abuses. These could be better checked if an accurate register of the owners of slum property were kept, and if more power were given to, and exercised by, the County Councils and Local Government Board to step in directly where the local body neglected its duty. Various serious complaints were made by competent witnesses against the Local Authorities in Dundee, Edinburgh, Sheffield, the Staffordshire Potteries District, and elsewhere. The real need is driving-power behind these authorities. It is an enlightened and patriotic public opinion for which the countryside groans. Are the men of splendid ability among us content to pile up personal fortunes, or to surrender themselves to the luxury of ease, or the scarcely less enervating luxury of intellectual enjoyment? When will our best men realise that the best work, and that nearest to hand, is lying undone or badly done? How long must local administration languish, and the people suffer, for want of the wisdom, skill, and saving common-sense which

thousands of men are giving every day to their private concerns? Of good business men we have many, but good citizens how rare they are! And yet things are better than they were, and the reformer must possess his soul in patience and plead in season and out of season for men rather than measures.

Unfortunately it is not only Local Authorities who are lax. The Committee call attention to the great devolution of power in recent years to local bodies, but nominally these bodies are subject to the control of the Central Government, whose duty is to keep them up to the mark, to level up backward districts, and to restrict wasteful expenditure. But, alas, we read that "the mass of routine work in which the Local Government Board is immersed, affords it little time for the consideration of questions of public policy in the sphere of health." By all means let us have the suggested "Advisory Council"[1] if that will cure the Local Government Board of its love of "mint and anise and cummin," while "the weightier matters of the law" are omitted.

It seems agreed that the conditions of life in factories have greatly improved in our time, and while no doubt the Factory Acts need strengthening in some respects, care must be taken not to introduce further reforms too suddenly, lest we kill the goose which lays the golden eggs of national wealth. On the other hand, it is necessary to endeavour to level up small workshops by bringing

[1] Report, pp. 24, 25.

the conditions of the Factory Acts to bear on them. Small workshops and home work generally escape the Inspector, and are liable to be under the thumb of the "sweater," who is thus able to produce, often under most insanitary conditions, hand work to compete in price with goods turned out from large factories. If we must have cheap clothes, by all means let us prefer the shoddy products of Leeds mills to those turned out from East London sweaters' dens.

Alcoholism

"The question of drink," say the Committee, "occupies a prominent place among the causes of degeneration," and they endorse the opinion of a witness that "if the drink question were removed, three-fourths of the poverty and degradation would go along with it." The craving for drink is partly cause and partly effect of the various other factors already referred to. It is true that squalor and overcrowding drive people to the drink shop, but it is also true that a period of prosperity and good wages brings with it a large increase in the consumption of beer and spirits. There is no evidence that drunkenness is on the increase—the facts seem to point decidedly the other way; but "the tendency of the evidence was to show that drinking habits among the *women* of the working classes are certainly growing, with consequences extremely prejudicial to the care of the offspring."

Two expert medical witnesses were examined as to the effects of alcohol. Their evidence was

very strong, and the Committee were "convinced that the abuse of alcoholic stimulants is a most potent and deadly agent of physical deterioration." Improvement is suggested in many directions, in Public House Trust Associations like Lord Grey's, in more facilities for outdoor life, in larger opportunities for the young to find pleasure and stimulus in physical exertion, but "the Committee are impressed with the conviction that some general educative impulse is in request which will bring home to the community at large the gravity of the issue." They suggest we should follow the example of France, and supplement by State action the dissemination of temperance literature. Moreover, teachers should be systematically trained in the laws of health, and municipal authorities and others should organise lectures on public health especially designed to reach young mothers. The London County Council is now doing good work in this direction, and a public placard such as was suggested by the Committee has recently been issued by the Woolwich and other Borough Councils.

The gradual education of public opinion is no doubt the surest way of combating the drink evil, but something has been, and more might be, done to carry out the recommendations of Lord Peel's Commission, which reported in 1899 (see suggestions by one of the present writers in the *Economic Journal*, vol. x. p. 264). The effect of that Report was spoilt by the split between the majority under Sir Algernon West and the minority under Lord Peel, but the more moderate majority Report, which

was signed by the "trade" representatives as well as by the impartial panel, suggested many minor but important reforms in the Licensing Laws, several of which have not yet been carried out. No little harm has been done by those temperance reformers who agree in persistently refusing the proffered "half-loaf," though they cannot agree among themselves as to the form the whole one should take.

The Rural Exodus

There is no doubt that the effect of town life in reducing physical efficiency is largely made up for by the migration into towns of the best of the rural population, which is consequently declining in number, and perhaps also in quality. It is said that there is a falling off in physique among country people, but in the absence of an anthropometric survey it is impossible to be certain of this. It is agreed that a diminishing number of people living on the land is a national evil, due partly perhaps to the difficulty in some districts of obtaining small holdings or allotments—the Small Holdings Act being almost a dead letter—partly to the insufficient supply of cottages in the country; and this deficiency has been lately intensified in the districts within forty miles of London, owing to all available cottages being snapped up by motor-car owners and others who desire to spend their week-ends out of town. The recent interesting exhibition of cheap cottages at Letchworth will do something to stimulate building,

and to persuade Local Authorities to frame less prohibitive building bye-laws, since there is no need to insist in country cottages on all the strict conditions necessary in a crowded city. It is, however, doubtful if the present system of linking cottages with farms, and letting them to labourers at less than the cost of maintenance, will ever afford a sufficient supply of cottages. Wages will have to go up till the labourer is able to pay a full competitive rent. Rents will be higher all round, and builders or landlords will be able to build freely, and obtain a fair return on the capital expended. But rural things move slowly, and we may wait long.

The first garden city is an interesting experiment which, if successful, may in time help to stop the rural exodus. More might be done in a somewhat similar direction if the Local Authorities were given the power, and had the courage, to forestall the growth of great and dreary suburbs by laying out the land with a view to its development on rational and health-giving lines. In this task they could learn from Germany, where the thing that seems to us so hard is actually being done.

Moreover, the Education Act of 1902 gave powers to Local Authorities, which, if properly used in rural schools, might keep in the country many of those who, to again quote the Committee, "are tempted to incur the competition of town life with no better prospect than to swell the ranks of unskilled labour, owing to lack of interest in their home surroundings, and to no effort being made

to open their minds to the resources and opportunities of rural existence, and to the saner and more wholesome atmosphere that pervades it. . . . Teach the children to take an interest, not only in books, but in the life of the fields. Teach them gardening and how to keep bees, the making of cheese, and the management of a dairy." This is good advice, but it is not easy to carry out.

One of the present writers was a member of the late Hendon School Board, in whose area was a rural school on the borders of Edgware parish. He persuaded the Board to buy a strip of land next the playground with a view to future extension and to immediate use as a school garden. But the head teacher strenuously and successfully opposed the plan, and the elder boys were and are taught shorthand as "more useful and practical" than gardening! Unless one of the school staff loves gardening himself, it is rarely possible to find any local person who can teach this subject so as to give it educational value. In this respect the old country may well learn from Canada, where the public munificence of Sir W. C. Macdonald has provided large sums to establish "object-lesson" school gardens in different centres, in each of which there is also the necessary equipment for teaching domestic science and manual training.

To study this new form of education and adopt it to rural needs, the teachers were first sent to Cornell and Columbia Universities for courses in horticulture, agriculture, and entomology, and

finally attended the Ontario Agricultural College at Guelph, where they worked their own garden plots just as their pupils now do in the school centres. The Macdonald School Gardens have thus become organic parts of Canadian school life, and the children, working among growing things, grow themselves in body and mind and spiritual outlook. We commend the example of Sir W. C. Macdonald to the public-spirited men of wealth among us.

A similar train of thought is suggested by our recent experience in Cornwall, where we were surprised to find that there were no arrangements for teaching swimming in any of the local schools we visited, and that very few of the lifeboat men themselves could swim. Yet the expert witnesses called before both the Committee and the Scottish Commission agreed as to the very high value of swimming as a form of physical training, and in London at least it is in the curriculum of many schools, and is well taught.

The evils which attend the townward movement of the better types follow still more closely their emigration to the United States and the colonies, and especially in Ireland the results appear to be very serious. "The witnesses from that country were emphatic in ascribing to emigration fatal effects upon the physique of the people by the withdrawal of the strongest and best types, thus leaving it to the less able-bodied to reproduce their kind and carry on the race." There is no doubt a wider sphere in the colonies for strong

and energetic men and women, but these are just the people we cannot spare. The State at least should not help such to emigrate. The colonies need a larger infusion of English blood, and there seems to be every reason why men and women who have more or less failed at home, but who are physically and mentally fairly sound, should be helped, perhaps on some such lines as those recently proposed by General Booth, to start anew in the freer and healthier surroundings of colonial life. Canada does not in equity belong to the Canadians, nor Australasia to the Australians. They did not conquer the broad lands in which they live; they have not defended them, nor even paid for their defence. They cannot claim a right to suck the best blood of the Empire, and to refuse to help it solve its problems. Shall the children, whose young lives depended on deep draughts from the mother's breast of England, grow up to refuse to help her because they no longer need her help?

There has not of late years been sufficient emigration from England to cause serious deterioration, but Sir John Gorst and others believe that the decrease in the birth-rate, which has been noted in the last two decades, has had this effect, since "the race is propagated in the greatest proportion by the least fit part of it, the restraints on marriage disappearing as you reached the most unfit." There seem to be no statistics to bear out this view, and expert opinion differs both as to the actual facts and the tendencies behind the facts.

Food

No such difference of opinion exists as to the serious degeneration which may be, and in some cases has been, caused by improper or insufficient food. Experts unite in condemning the excessive use of tea and bread in the diet of the people. Tea and bread and jam, the staple food of vast numbers of the children, is a very bad substitute for oatmeal and milk; and tinned foods have brought evil with them by displacing home cooking. It would almost seem that cooking is becoming a lost art in England. This is due in many places to the mothers going out to work in factories, and is one of the serious evils in modern industrial life; but we are also told that "a large proportion of British housewives are tainted with incurable laziness and distaste for the obligations of domestic life."[1] Nor does this apply to the poor only, for we find Mrs. Huth Jackson, in the *Nineteenth Century* for August 1905, saying, "To-day the English lady is the worst housekeeper in the world. . . . Housekeeping should come before art or philanthropy or athletics. . . . The nation is sick. . . . Drugs are of little avail . . . look to the only alternative cures . . . viz., diet or the knife. . . . Let us pray that we may escape the knife, and reform our every-day diet in a simple and practical way."

Heavy tea-drinking is the cause of great

[1] Report, p. 40.

numbers of recruits being rejected for enlistment. It is almost the only breakfast food of the factory women, and is repeated very often with "pickles and vinegar" for the mid-day meal. Hence, of course, dyspepsia, then alcohol to allay the pain, and physical and mental ruin for the woman and her children only too often follows.[1]

Not only is there ignorance as to the uses of foods, but "a very general disinclination to spend sufficient money upon food, even among those with ample resources," especially young women. Desire for adornment, love of amusement, and especially betting and drink—these consume the money which should go for food, and which even without these deductions would hardly suffice in a vast number of cases to adequately feed the family. There is no need to fill in the details of this picture—they are far too familiar. What remedy has our Committee to offer us? There is need of "training of a socially educative character among girls and young women," of "mothers' meetings and lectures conducted on simple and practical lines," of "health visitors in the employment of the Local Authority, or acting in co-operation with it," of radical reform in the present unpractical methods of teaching girls at school, and still more of compulsory attendance twice a week of all girls who have left school, at continuation classes where physical training shall be given, discipline enforced, and every branch of domestic hygiene taught. Are these reforms too much to

[1] See Report, p. 41.

ask for? Again we depend on the driving-power of an enlightened public opinion.

Infant Mortality

The question of food is specially brought home to those who have studied the returns of infant mortality. This is, as the Committee say, the "dark page" of our vital statistics. The Registrar-General has furnished a number of tables, from which it appears: "first, that infantile mortality in this country has not decreased materially during the last twenty-five years, notwithstanding that the general death-rate has fallen considerably; secondly, that the mortality among illegitimate children is enormously greater than among children born in wedlock; thirdly, that about one-half the mortality occurs in the first three months of life."[1] Preston heads the death-roll with an average infant death-rate of 236 per 1000 births, and Burnley, Blackburn, Sheffield, and parts of London are nearly as bad. The death-rate is highest where the women go to work in factories, but we read, as one example out of many, that "in Burnley one woman is said to have had twenty children and buried sixteen, all having died between one and eleven months of age; in this case the father was a collier in good wages, and the mother stayed at home." There is no doubt as to the connection between infant mortality and (1) bad or insufficient feeding, and (2) the overcrowding of one or

[1] Report, p. 45.

two-roomed tenements, and (3) there is a strong presumption that it is also connected with the employment of mothers.

Two reforms requiring the sanction of Parliament are recommended: (1) to compel the registration of still-births; (2) to compel the production of a medical certificate in every case of registration of a death. If these things were done many irregularities would come to light, and the figures as to infant mortality could be made complete.

Some increased stringency seems advisable in the law forbidding the employment of women within four weeks after childbirth. The factory owner is only responsible if he *knows* the law is broken, and as a result evasions are frequent and prosecutions impossible. It appears to be at present undesirable, even if it were possible, to forbid the employment of mothers in factories. Public opinion in Lancashire and the Potteries would be overwhelmingly opposed to such a change, and it is distressing to note that among the women there is a "general preference for factory over domestic life." How many forces seem to combine to break up English home-life!

Part of the infant mortality is said to be "due to the fact that infants are nowadays seldom fed from the breast." Dr. Hutchison says this is common to all highly-civilised people, save the Jews. No doubt the infants suffer greatly from the loss of their natural food, but it is easier to deplore the fact than to suggest a remedy.

Recent Experiments

Perhaps, however, something can be done in the direction indicated by an interesting article contributed to the *Times* of December 26, 1905, by Miss Bunting, who describes the system which is being worked by a committee of ladies in Paris to encourage breast-feeding. Its simplicity certainly commends it. Rooms are taken in very poor quarters, and in them are supplied gratis two good meals a day to every woman with a child at the breast who cares to apply. There seems to be no difficulty in obtaining the necessary funds, and Miss Bunting assures us that the help thus given at the time when the infant is drawing heavily on its mother's strength is most beneficial alike to mother and child. Such a system is perhaps easier to start and maintain in Paris than in London, for in Paris the birth-rate is lower, and public opinion is concerned in encouraging the procreation of children. If it acts by way of making things easier for the first twelve months to the mothers of illegitimate children, the gain would perhaps be doubtful in London. With us, too, the birth-rate among the poorer classes is still probably much higher than prudence would warrant, or the sociologist desire.

Another experiment in the same direction was described in the *Times* of December 28, 1905, and is being carried out in Longwood, a suburb of Huddersfield. Here to the mother of each child born a promise is made to pay £1 on the

child's first birthday, and meanwhile a committee of ladies make friends with the mother, visit her, and give her advice as to the bringing up of the child. So far, the effort is said to have been most successful, and the death-rate among the infant population has fallen one-half in six months.

To experiments such as these point is given by the publication of the Report of the Medical Officer of the London County Council schools, in which it is shown that, so far as the limited number of figures go, in a year in which infant mortality is high the physique, even of the survivors, is poor, and when the infant mortality is low the survivors are stronger. If, then, we can keep down the mortality, we may hope not only to lessen suffering and waste of life, but also to produce a stronger stock.

Milk Supply

If, however, the child cannot get breast-feeding, what is the alternative? "Modified cow's milk," we are told, "is by far the best."[1] But the poor more often use tinned milk, which is dearer and inferior; or, what is worse still, "highly diluted and probably sour cow's milk, in which groats or bread have been soaked." Then, early in its career, the unfortunate child is encouraged to eat whatever the parents eat, so that one witness cites a case where a baby, who was very ill, had been fed on tinned salmon and orange juice.[2] Pure milk is clearly the first necessity of life for children; and

[1] Report, p. 51.

[2] *Ibid.*, p. 57.

the Committee tell us that it is next to impossible for the poor to obtain this article either in town or country. The cows are not kept clean in the farms, proper precautions are not taken for milking them into clean pails, and there is no security against diseased cows. Then the milk has to pass through many hands; it gets full of dirt; it is preserved with successive doses of boracic acid; and, of course, is not seldom robbed of part of its cream or adulterated with water. Even when it reaches the home it will probably be further contaminated through the consumer's ignorance, and will perhaps be finally sucked by a child through a long india-rubber tube which cannot be kept clean.

As before, the remedy rests with the Local Authorities, who have ample powers to register and inspect cowsheds, dairies, &c., and the Local Government Board, which can make overriding orders. These powers are in many districts not used. Then for fighting the ignorance of mothers we must fall back on the school and continuation classes and other means of social education already referred to. At Battersea, Liverpool, and other places the Local Authorities have undertaken the function of supplying sterilised milk at low prices; but there are serious objections to a municipality acting at the same time as a milk-trader and a censor of other milk-traders; and expert opinion is divided as to the value of sterilisation, some doctors holding that the process reduces to a minimum the nutritive value of the milk. The Committee could not recommend municipal selling nor (till further

investigation has been made) sterilisation, but they have no doubt that all milk on leaving the cow should be promptly refrigerated to a temperature of 40° Fahrenheit.[1] The Committee have a depressing section in which they refer to parental ignorance and neglect, ranging from bad feeding and neglect of sleep to the pernicious practice of giving infants india-rubber nipples to suck, and they proceed to plead for the full use of the powers given to Local Authorities by the Midwives' Act of 1902, and to urge the extension of health societies on the lines of the Manchester and Salford Ladies' Public Health Society, whose "health visitors" have done so much sanitary and educational work in those towns.

Feeding of School Children

On the questions of the Medical Inspection and the Feeding of School Children fresh light has been shed by the Report, dated November 9, 1905, of the Inter-Departmental Committee appointed in the previous March to ascertain what is at present being done. So far as concerns Medical Inspection we have already dealt with this Report. The feeding of school children remains, and the question is still the centre of heated controversy. It must be remembered that an enormous majority of the children attending elementary schools are sufficiently, though often improperly, fed. Most of them, too, live near their homes, and it would

[1] Report, p. 55.

be a great pity to do anything to break up the home life which centres round the mid-day dinner. Let us not commit the error of considering the children at school apart from the rest of the family. The family must be treated as a unit. If there were no dinner to be cooked for the children, the mother would often have no proper dinner herself. When there is temporary distress it would seem better to relieve the family as a whole than just those members of it who are attending school. If the distress is permanent for whatever reason, and the parents cannot properly bring up their children, the proper course is to refer the matter to the Poor Law Guardians. There are, therefore, very great objections to any wholesale system of feeding school children. The last-mentioned Committee have found very foolish methods at work in various districts, and an extraordinary absence of co-ordination, or indeed of any carefully thought-out plans. One gentleman discovers that a number of children in the schools of a certain district are underfed. He makes apparently no inquiries as to whether any other organisation is at work in the district. He collects £400 or £500, and organises breakfasts for all the 1400 children to whom the teachers think it wise to give tickets. The breakfasts cost about one penny per head, and each child receives a mug of coffee with milk, a roll, and a piece of *cheese*. The gentleman says in his evidence: "That is rather a strange meal, but I am very fond of cheese myself, and it was my choice that we should give the children the

cheese"[1] He continued the breakfasts till April, and then suddenly ceased, though he admits that the exceptional distress still continued, and there was no similar agency to take their place. We cannot wonder that the Committee earnestly plead for organisation under the central authority in each district, for careful inquiry into the circumstances of each child, and for whatever machinery is set up to be permanent at least in skeleton.

But in an article like this we cannot go beyond broad principles, and we return to the question—ought the State to interfere in the feeding of the children, and if so, on what lines should such interference proceed? The fact is now proved that in some districts a considerable proportion of the children, and in others a sprinkling of them, attend school so underfed as to be unable to profit by the teaching provided, which is therefore wasted. A certain number of these cases ought to be dealt with under the "Relief (School Children) Order, 1905," by the Poor Law Guardians, the money spent on relieving the children being treated as a loan advanced to the parent, and recoverable from him. The Guardians ought to deal with cases where the parents are permanently impoverished, and with those where the parents are able to provide food but have neglected to do so. There remain, as the Board of Education has pointed out in its circular of April 1905, cases where temporary illness, loss of employment, or other unavoidable causes, have for the time incapacitated

[1] Report, p. 50.

the parents from making necessary provision for the child, and these are the cases for which charitable provision should perhaps be made. Clearly, if help is given at all it should be adequate. The Committee complain that most of the present London schemes only provide one or two breakfasts or dinners a week. This, they say, is of no use at all. Money so spent is wasted, and the children are probably injured rather than benefited by their home arrangements being upset. The meal, whether breakfast or dinner, (and there is difference of opinion as to which it should be), must be given every day the school meets. It will cost probably from one penny to twopence, and if some of the meals are given free, it has been found generally impossible to induce any of the parents to pay. The giving of meals to children must be regarded as a serious inroad on parental responsibility, and as such only to be undertaken from sheer necessity. For obvious reasons the selection of the children should not be left to the teachers, though it is not unreasonable to ask them for a preliminary list of children apparently needing food. On no account should the selection depend on questions asked directly from the children. In one school the children who had had no breakfast were asked to stand up. Two only did so. Of these one had just eaten four slices of bread and jam, and the other had had breakfast, but had previously obtained twopence from a soft-hearted Sunday School teacher by telling a similar lie. Inquiries should therefore always be made

at the home, and from the relieving officer and the school attendance officer. The Committee found that in every case where proper inquiries were made the number of children fed was greatly reduced. As to funds, the various Blue Books agree that voluntary subscriptions may be relied upon to produce all that is necessary. It is far easier to obtain charitable contributions than to spend them wisely. Each Education Authority ought to insist on an advisory control over all schemes for feeding the children in its district, and in return should allow the free use, where necessary, of its buildings and staff for the purpose; but the teachers ought not to be expected to take part in the actual service of the meals, and wherever possible the food should be served elsewhere than in the class-rooms.

Let us regard the school feeding of children not as an ideal, but as a necessary evil; and then, if we take sufficient precautions, we may succeed in giving real help to poor children whose hunger rightly enlists our sympathy, without too greatly pauperising the parents or breaking up the home life. But the end to be ultimately aimed at is so to train our girls that as mothers they may be able and willing to properly feed their children, and so to educate our boys that they may become worthy citizens, neither seeking nor receiving help for the maintenance of their families. There is much to be said for providing hot cocoa or milk for country children who come long distances to school, bringing their food with them, and this is being done in

some places on self-supporting lines. So too for the special schools which the Physical Deterioration Committee suggest for "retarded" children. These would be of the type of the present "Day Industrial Schools," where the children are regularly fed, and part of the cost is levied on the parents under a magistrate's order. In the case of backward children it would no doubt be found that good feeding would work as wonderful changes as have been brought about in the special schools for the "mentally deficient."

Continuation Classes

We have already referred to the need for compulsory continuation classes for boys and girls from fourteen to sixteen. The need is a very pressing one. The children leave school, and then for several years, now that the apprenticeship system is disappearing, knock about the streets as errand boys, "matching" girls, newsvendors, or baby-minders. Discipline is lost, lessons superficially learnt are hastily and gladly forgotten, bad language and the pernicious practice of smoking cigarettes are acquired, and hooligans manufactured. Much of this evil could be stopped by compulsory evening-school attendance, and the time should be given, one half to drill and physical exercises, the other, in the case of girls, to domestic training. Not even at sixteen should the boys pass out of the control of the State, for, as urged by Sir James Goldie in

the Report on the South African War, as well as by Lord Roberts, Dr. Macnamara, and many other experts, every lad between seventeen and twenty not an efficient member of a volunteer or cadet corps should be compelled to give, at least, four hours a week for two years to military training. This would not encourage jingoism; it would give that restraint which comes from a knowledge of the meaning of war. It would make conscription unnecessary, and it would work wonders for the health and strength, and still more for the characters of our citizens.

Sexual Immorality

One other subject claims our attention before we close, and this, too, is dealt with by the Physical Deterioration Committee, viz., the evils resulting from venereal disease. The witnesses examined were agreed that there was no increase of syphilis in this country, but they gave terrible evidence as to its widespread ravages, and especially as to its inherited effect in the second and third generations. Sir A. Cooper and Sir Victor Horsley pointed out that "owing to the comparatively small practical inconvenience attending the first visitation of the malady, curative measures were frequently postponed, and the tainted persons left to infect others," and strongly advocated compulsory notification; but the Committee shrank from recommending this step, and urge that a commission of inquiry into

the prevalence of the disease should be appointed. They also point out the inadequacy of hospital accommodation for this disease, and the reluctance doctors have in putting syphilis on a death certificate, so that many of its evils escape notice. For ourselves, we think the inquiry should take a wider scope. The state of the London streets should be investigated, and the terrible standing danger of women, often infected with syphilis, soliciting for prostitution in the public thoroughfares should be dealt with in some more satisfactory way than the present law allows. The question is a thorny one, and the public is very sentimental, but a State which makes laws for Public Health cannot rightly allow a terrible and loathsome disease that strikes down tens of thousands of our fellow-citizens, and spells ruin for hosts of children yet unborn, to spread its infection unheeded, because, forsooth, Society does not like to discuss the subject! A gigantic mischief calls for drastic changes in the law, far more than the public, who are ignorant of the facts, would sanction. The time will come when the feelings of the individual must be sacrificed for the good of the community, not only in this matter of venereal disease, but in the larger question of the propagation of the unfit. The science of Eugenics, to which Mr. Francis Galton has called scientific attention, has not yet made sufficient progress to influence the legislature. It is doing "spade work" at present, but as the facts of heredity become

reduced to laws it will be possible, as it is eminently desirable, to put some limit to the increase of the unfit, and perhaps to encourage the generation of the fit. Mr. G. R. Sims has pointed out the danger of allowing lunatics, half recovered, to leave the asylums to propagate their kind (see *Daily Telegraph*, December 14 and 19, 1904), and has stated that the families of feeble-minded parents are usually of more than normal size, and most of the children are feeble-minded too.[1] Should not some steps be taken to persuade Society to recognise that such marriages are a crime against the race and disgraceful to all concerned ?

And here our survey of the problems suggested by the term "physical development" must cease. We have followed for the most part the path trodden by the committees of public inquiry that have recently drawn fresh attention to the subject. We have at each stage endeavoured to point out the reforms suggested by that saving commonsense which is according to knowledge, which is, in fact, science. We do not ask that the health and physical development of the nation shall be handed over to specialists, but we plead that the nation itself, or at least its more intelligent citizens, should take the trouble to see these problems

[1] During the sixteen years to end of 1905 a large increase in the number of lunatics had taken place in the county of London. While the population had increased at the rate of 11.87 per cent., the number of pauper lunatics had increased at the rate of 75.9 per cent.

In 1890 the number of pauper lunatics in London was 16,358; in 1905 that number had risen to 24,652.

clearly, and to see them whole, to take expert advice where necessary, to arrive at well-reasoned conclusions, and then, in the form of an enlightened public opinion, supply driving-power to every department of social life.

SCIENCE AND CITY SUBURBS

By Mrs. S. A. BARNETT

THE scientific spirit is dominant. Men and women who have had no training in science, and have but little interest in its discoveries, have changed their methods of thought, and the source of the change is the prevalence of the scientific spirit. They do not recognise the "rock from which they are hewn," or what it is that has altered their point of view; they only know that they are no longer content to accept conditions as right because they exist, or disposed to believe that laws govern the material world, while chance only rules the social and moral phenomena of life. In practice people are more disposed to seek out causes for events and to take steps to direct their issues.

This spirit has influenced philanthropy. Many years ago it was deemed sufficient that those who had this world's goods should feel pitiful towards those who had them not, and that a generous heart could be safely left to its own instinct to "do good." Around this opinion, happily now dying, if not yet wholly killed by the scientific spirit, lie the bodies and souls of the thousands of men and women who have been helped to their destruction

or deterioration by kind hearts acting without thinking heads. But out of the ashes has risen (largely owing to Mr. Charles Booth) the phœnix of a "more excellent way."

The Conditions of Town Life

"We are very much in need," said the Right Honourable James Bryce, in his address on the aims of the Sociological Society, "of the exact and thorough scientific knowledge which alone can solve the social problems with which this country has to deal." . . . "Britain must bear worthily her part in the great task of synthetising knowledge and turning it into practical account in the field of human sciences," and it is "Civics as applied to sociology," which Professor Geddes urges the thoughtful to study, because only "on the sociological view of city development is to be found the basis of an adequate civic policy."

A very short study of the conditions of town life is enough to show that the dwellings of the people is one cause from which follows health or disease, happiness or misery, strength or weakness. The houses which are the homes of so large a number of the population of the richest nation in the world have been often described. I will quote one such description :—

"Thousands of our fellow-countrymen are compelled to live under conditions which are a scandal to our civilisation. They are housed in close, dirty, evil-smelling lanes and courts, deprived of fresh air

and sunshine, strangers to the sight of grass and flowers and trees, without opportunity for healthy recreation, familiarised with evil from early childhood, and surrounded by vice and temptation on every hand.

"All this inevitably tends to produce moral and physical deterioration. It is almost impossible for people to maintain a high standard of character and physique where all the conditions are adverse, and we have only to visit the places described in order to see how disastrous are the results. Little wonder if, while many battle bravely against their surroundings and rise superior to them, an immense number succumb and go to swell the mass of vicious, criminal, and diseased humanity which is a disgrace and menace to our country.

"Further, it should be remembered that, even where the conditions are far removed from those just depicted, the lot of many is cast in those dismal monotonous streets, so familiar in all our great towns, where gardens are an impossibility, and miles of brick and mortar intervene before the country can be reached, and where those who work during the day in office, factory, or shop, must seek their recreation in the club, the theatre, the reading-room, or the public-house, instead of in the pure free air of the country."

This extract is from the Booklet explaining Mr. George Cadbury's motives in founding "The Bourneville Village Trust," and from thirty-three years' life in Whitechapel I can endorse every word of it. It is one of the advantages of living

so long a time in the same place that one is enabled to see not only the parents, but to watch the children, and in some cases even the grandchildren, and to see the cruel influence, "even unto the third and fourth generation," of the sins of the Community towards the individual.

Professor Galton suggests that among the subjects of those who study "Eugenics" should be the "Systematic collections of facts showing the circumstances under which gifted families have most frequently arisen." I would also suggest that a similar inquiry should be made "showing the conditions under which have most frequently arisen the lazy, the vicious, the hopeless, the degraded, and the 'unemployable.'" From my own untabulated experience, I would venture to affirm that it will be found that the housing of the people is largely accountable for the evils—spiritual and physical—from which this generation is suffering. How can people persist in striving after the realisation of the spiritual life, how can they rest in the knowledge of God when the normal decencies of life are denied to them, when their bodies are deprived of oxygen, and their minds crushed by sordid surroundings?

Private Efforts to Improve Town Conditions

The scientific spirit which is leading many minds to search for hidden causes has led them also to try and deal with this evident cause, and during

the last fifty years many definite attempts have been made to improve the dwellings of the poor. First in the field to try and solve the housing problem was not the Government, but individuals, and the names of the Prince Consort, Lord Shaftesbury, Mr. Peabody, Sir Sydney Waterlow, and Miss Octavia Hill are written, if not in short memories, yet in the improved lives of many thousands of people as well as in the raised standard of the public conscience. Being people with business knowledge as well as of philanthropic instincts, they planned so to build that the undertaking should pay interest on the capital expended. The result was that land being expensive, huge blocks of dwellings arose five, six, seven storeys high in the midst of the most crowded parts of the Metropolis. That such model dwellings, where the people could have two and three rooms, were and are an immense improvement over the homes huddled together in courts and alleys there can be no doubt. Figures—that accepted and incorruptible witness—testify to the fact. In Finsbury, where Dr. George Newman, the medical officer, has made interesting investigations, it has been found that the death-rate depends on the amount of cubic feet inhabited by the family.

The following table strikes the imagination as one hears behind it the oft-repeated statement, "Yes, mum! This is all I've got left. I 'ad nine, but buried six." It is mainly by the children's deaths that the disproportionate comparison of 3 from 1

and 1 from 3 is obtained—the one-roomed tenement yielding three of its occupants into the undertaker's hands for every one that is taken from the family who can afford to pay for three rooms. The official figures show how many—occupying

Size of Tenements.	Recorded Death-Rates from all Causes.	
	1903.	1904.
One-room Tenement . .	38.9	40.6
Two-room Tenement . .	22.6	21.9
Three-room Tenement . .	11.7	14.7
Four-room Tenement and upwards of four rooms . .	5.6	7.5
The Borough	19.6	21.1

only one room—thus live to die. In London 330,000 call one room "home." In England and Wales 3,000,000 are living in what is technically known as an "overcrowded" condition, namely, more than two persons in one room, and consequently the babies die. In England and Wales the death-rate is 16.2; in Liverpool, 22.5, 196 out of every 1000 of its infants leaving this difficult world before their first birthday; and Burnley loses still more, for there 229 out of every 1000 leave their mothers mourning. "But death," as my brother-in-law Dr. Ernest Hart used to say, "is not the worst evil of insanitary conditions and inhuman surroundings; it is but an evidence of a lower standard of life." Where the death-rate

is high, there the vitality is low. The people are tired, hopeless, fearful of adventuring either for work or pleasure, disinclined to put forth effort, ready to accept the enjoyment of watching instead of joining in games, prone to sedentary amusements such as can be obtained in music-halls or by gambling, falling into drunkenness, not so much from wilful wickedness as from dreariness, finding it, as Mr. Justice Day explained, as "the shortest way out of Manchester"—the cheapest method of escaping from the depressing influences of great cities and the unlovely barrack boxes or dirty alleys in which are situated the homes of the poor.

Lately, the nation, alarmed into considering its defences, has examined the physique of its town-bred population. During the South African War, out of 11,000 men who wished to enlist in Manchester only 3000 passed the low physical standard then in use, and of these 3000 only a few over 1000 could be sent into the army, about 2000 going into militia regiments.

"That the belief that the population of England, as it becomes increasingly urban, will not increasingly deteriorate physically, unless great changes are made in our towns and in the habits of the inhabitants, is unfounded," writes Mr. T. C. Horsfall, whose work and patient pursuit of civic ideals has made him a recognised authority on these matters, "few will doubt who compare the appearance of the inhabitants of a large manufacturing town with that of the inhabitants of those

districts in England where the mode of life of the people approximates most nearly to the mode of life of the greater part of the nation in the past. Hertfordshire, the district of Craven in Yorkshire, and the country parts of Cheshire are districts of the kind. In all of them a large proportion of the people work in the open air, and are reached by the light of the sun, and use a comparatively simple diet. A much larger proportion of tall, strong men are to be found there than in Manchester, and far fewer men are noticeable in those districts for their low stature or their slightness."

"The appearance of the men is so depressing; they seem so physically unfit," was the gloomy comment on one of the processions of the unemployed made to me the other day by one whose life's work and circumstances had kept from close acquaintance with the poor; and it is true. The town influences, including those which enable a man to amuse himself without effort, have brought many into the ranks of the unemployed because they are unemployable—and, alas! will so remain, unless they can be taken "one by one," and by good air, regular food, firm discipline, and patient friendship lifted on to the plane from which they can survey themselves as clothed in self-respect.

Municipal Efforts to Meet the Housing Difficulty

Private philanthropic enterprise which built block after block of dwellings, or set itself to

improve existing habitations, or more lately to erect cottages, seemed to make little impression on the condition of things I have described. Statistics showed that better housing meant better health, but still the strength of the nation was said to be deteriorating. Public opinion, still convinced that bad housing was the cause of the trouble, called on the Municipalities, with their command of capital and administrative ability, to take up the work, and this they did, using Part III. of the Housing Act of 1890, which gives "power to local authorities to buy land outside their town boundaries for the purpose of increasing the number of workmen's dwellings." Thus whole districts have arisen, the inhabitants of which are of one class only. The London County Council have bought 225 acres at Tottenham, on which are being placed, at the estimated cost of a million and a half, nearly 6000 cottages to house 42,500 people. At Edmonton there has grown up a population of 63,000 persons, all in the same social position. In West Ham there are 300,000 people, not 500 of whom keep a servant. Ilford has many hundreds of houses recently built, and but very few exceed the rental of 10s. 6d. a week.

The result of this activity, commercial and philanthropic, both individual and municipal, may be measured in a better hygienic standard, but modern thought applies other standards, and it has been recognised that there is danger in the division of classes. For miles to the eastward stretch out mean streets, and on the west and north lie

acres beyond acres of graceful homesteads. The inhabitants of London are no longer the inhabitants of one town. The classes are divided, and, ignorant of each other, suspicion grows. Suspecting each other, opportunities occur for distrusting each other, and with distrust grows dislike, and after dislike comes active animosity. The thoughtful patriot, with the examples of Japan and Russia before his eyes, is bound to recognise that the strength of a nation against both internal and external foes is mutual trust, understanding, and respect. The soil of suspicion cannot produce the strong tree, in whose branches its people rest in happy security, or whose leaves heal the waters of international strife.

The National Losses by Class Divisions

It is not, however, only the ethical side of life which suffers. The economical suffer almost as seriously. The division of rich and poor in what come to be different cities often constitutes economic loss. There is the difficulty of government. The citizens of a neighbourhood like West Ham have no resource on which to draw so as to do what is best for the education or the health of the people. In one district half-a-crown in the £1 will not pay for the schools, while in another under a shilling is sufficient. The difficulty is not only one of money, it is also one of ability and leisure. In the city of the poor there is a lack of men who are trained to think, and have leisure to put their

service at the disposal of the community. There is thus great waste of money as the local councils or the Boards of Guardians vacillate in their policy, or enter upon undertakings for which they have not counted the cost. The division is also responsible for considerable loss of money in necessary locomotion. The workman who has to do up a house in the west end has to travel four or five miles from the east end, spending time and money for which the community get no return. The charwoman or extra help often arrives to begin her work tired by the journey, and having already spent an ill-spared proportion of her earnings.

It may not perhaps be recognised as an economic loss, but if variety of aspect—the sight of houses and shops and buildings which stir up thought and inquiry, the near neighbourhood of gardens and handsome buildings, the bright character of the streets—if such things increase health and intelligence and joy in being, then their absence in the cities of the poor tends to inefficiency and to the reduction of the possible national wealth. "It pays to make the workpeople happy" is the conclusion of many employers, and that it is an economic loss that masses of people should live in depressing surroundings is a conclusion likely to be forced on a public opinion which has hitherto been inclined to think with its purse rather than with its heart.

Science in Public Affairs

The Haphazard Unscientific Growth of Towns

"We all know," writes Mr. T. C. Horsfall, "that our larger towns have been built at haphazard, and are still growing at haphazard; that no plan exists to ensure that, if a street is narrow it shall lead into a wider street, and that wider street into a street planted with trees, and to ensure that, within easy reach of every group of dwellings, there shall be a playground or some other open space. We all know that in the suburbs, on the fringes of all our towns, new narrow streets of small houses—in which semi-slum conditions will soon prevail—are springing up unchecked, which increase (by new large areas of ugly crowded buildings) the long distances which already cut off the inhabitants of the central districts from beautiful vegetation and fresh, clean air."

The haphazard unscientific extension of towns has taken from the people many of their opportunities of enjoying beauty. The loss is one not easily compensated, and attempts to estimate "moral damage," as well as material, has met with some scorn. But deficiency in national character means deficiency in common wealth, and ignorance of country pleasures and the absence of the enjoyments which come from relation to Nature and knowledge of her ways, must take strength from character. The health, the vigour, and the alertness which wholesome recreation in the fresh air

engenders are unattainable by town-livers, who, indifferent to, because ignorant of, what they have lost, are content to be "like beasts with lower pleasures, like beasts with lower pains."

The Hampstead Garden Suburb

It may be said that it was the scientific estimate of these social and civic ills which resulted in the creation of the Garden Suburb Trust, whose objects are best told in the words of a letter to the *Times* by the Trustees:—

"*First.* We desire to do something," they write, "to meet the **housing problem,** by putting within the reach of working people the opportunity of taking a cottage with a garden within a 2d. fare of Central London, and at a moderate rate. We have already evidence that the opportunity would be eagerly seized, and we believe that in cleaner air, with open space near to their doors, with gardens where the family labour would produce vegetables, fruit, and flowers, the people would develop a sense of home life and an interest in nature which form the best security against the temptations of drink and gambling.

"*Secondly.* Our aim is that the new suburb may be **laid out as a whole** on an orderly plan. When various plots are disposed of to different builders, and each builder considers only his own interest, the result is what may be seen in the unsightly modern streets. Our hope is that every road may have its own characteristic; that small open spaces

be within reach of every child and old person; that no house may darken or offend a neighbour's house; that the whole may be grouped round central features and central buildings; and that from every part there shall be good views or glimpses of distant country. We believe that the successful example of such a plan of town development might take away some of the anxiety now caused by town extension.

"*Thirdly.* We desire to promote a **better understanding** between the members of the classes who form our nation. Our object, therefore, is not merely to provide houses for the industrial classes. We propose that some of the beautiful sites round the Heath should be let to wealthy persons who can afford to pay a large sum for their land, and to have extensive gardens. In other parts there will be houses with rents from £30 to £150 a year, so that every resident (the cottager paying from 7s. 6d. a week and the richer people paying from £30 to £400 a year) may share in the church, the chapel, the public library, and the open space, not by forced, artificial methods, but as inhabitants of the garden suburb.

"*Fourthly.* We aim at **preserving natural beauty.** Hampstead Heath, by reason of the spacious views it offers, is a resource for Londoners which is yearly more appreciated. If the Eton College Estate, occupying as it does the foreground of the wide western view, is covered with the usual long, narrow streets, or built over by block dwellings, much of this attraction will be lost. Our

object is so to lay out the ground that every tree may be kept, hedgerows duly considered, and the foreground of the distant view be preserved, if not as open fields, yet as a gardened district, the buildings kept in harmony with the surroundings.

We are,

Sir,

Your obedient servants,

CREWE.
A. F. LONDON.
JOHN E. GORST.
ROBERT HUNTER.
WALTER HAZELL.
HERBERT MARNHAM.
HENRIETTA O. BARNETT (*Hon. Sec.* Garden Suburb Trust), Warden's Lodge, Toynbee Hall, Whitechapel.

"*March* 6, 1905.

"*P.S.*—Earl Grey was the chairman of the Garden Suburb Trust until his appointment as Governor-General of Canada."

The opportunity of carrying out these objects has been given by the Eton College Trustees, who are prepared to sell 240 acres of their land to the Garden Suburb Trustees for the purpose of creating a model garden suburb. The land is peculiarly adapted for the uses to which it is to be put. Writing of it, Sir Richard Farrant, whose work in connection with the Artizans', Labourers', and

General Dwellings Company has been a public benefit, says: "I have looked into your Hampstead Heath Extension scheme with the Garden Suburb project adjoining. The price at which you have the option of acquiring the land is a reasonable one, perhaps I may say is a favourable one. The locality of the land, having regard to the nearness of the new tube stations and the prospective tramway developments, is unusually good. The shape of the land is especially favourable for the division of the property into sites for different classes of inhabitants."

Description of the Scenery around the Garden Suburb

More poetically it has been described by the editor of the "House Beautiful," who writes:—

"Within four and a half miles of Charing Cross, at the present time, may be heard on the still night air the hoot of the owl, in the pauses of the song of the nightingale, and by day the trees are vocal with the songs of many birds. In deep recesses under the yellow gorse the harebell tolls its bell of tender blue, and the bracken grows in luxurious tangle. Between the tall trunks of the pine-trees, which crown the hill, is seen a wide view stretching westward, bounded by the pointed hills of Harrow and Stanmore, while in the valley glints the white sheen of the lake at Hendon.

"It is a scene which any great city should cherish as one of its most valued possessions; and yet it came near to being lost to London for ever.

"At the foot of the hill is an old-fashioned farmstead known as Wyldes Farm. Here the cows graze in wide, undulating pastures, the hay is made every summer and gathered into stacks, and life passes peacefully, as if the great city with all its strain and stress, its noise and bustle were not almost within sound of the sunny, silent reaches of the farm.

"The land stretches away to the uplands and copses of Bishop's Wood on one side and to the great highway of the Finchley Road on the other; and it has a long frontage to the Heath, which extends from North End to near the well-known Scotch Firs.

"But these undulating pasture lands, these woodland retreats on this side of Hampstead Heath, were doomed. In extending the Tube Railway to Hampstead Heath it was decided to place a station at North End, close to Wyldes Farm, and the whole of the farm lands were destined to be covered with streets of small houses for the industrial classes.

"It does not require a great stretch of imagination to realise how the sylvan beauty of the Heath would be destroyed by the trampling of thousands of heedless feet, and the view, so beautiful and inspiring, would be ruined by the streets of mean houses with monotonous rows of slate-covered roofs.

"To preserve the beauty of the Heath to the enjoyment of all for ever, and to secure the wide farm lands as an open space, and also as the site

of an ideal village or suburb, became the great desire of Mrs. S. A. Barnett, of Toynbee Hall.

"The story need not be told here how, by unremitting endeavours, aided by a strong committee, the funds were raised to purchase eighty acres, in the centre of the property, as playing-fields.

"It is now proposed to purchase the rest of the estate, comprising 240 acres, and to erect a City Suburb for the habitation of persons of different classes of life—who can all and each enjoy the beautiful scenery and fine air of Hampstead, and who can live together in the spirit of mutual helpfulness and kindly forbearance."

With true sympathy have those last words been written, for the ways of various classes are so different that it will need "kindly forbearance" on both sides to bring them to an appreciative understanding.

"You want us to live near the rich, my dear Lady? Well! you won't get me for one. I would not bring up my youngsters in view of such examples as they will mostly set. Waste without want, and idleness without starving; money is their God, shirk work is their aim. Women too fond of pleasuring to be decent mothers, and everybody eager for play, and victuals and drink the subject of talk at most meals—so they tell me. We may have faults—and we have a good few, I don't mind owning it, in my class—but not that sort of fault, and we don't want to add their sort to our sort"—and so on, talked a leading working-man friend, as early in the scheme's life

I propounded the idea to him; and as he talked I first felt very discouraged, and then very resolute. If this is his idea of the richer classes, did there require to be another evidence of the need of a greater knowledge, which would lead to a more just appreciation? So I took heart, recognised that such misunderstanding could only be broken down by degrees, not by artificial methods, but by the more simple means of a common interest; and the common interest in the Garden Suburb will be the time-honoured one of a garden, and the love of flowers and fruits and growing changing things.

The Value of Gardens

In the Garden Suburb every house, however small, will stand in a garden, which, as a rule, will be worked by the tenant himself, but sometimes, as in the case of clerks, women, or persons whose bread-winning employment takes all the daylight hours, it will be managed under a Co-operative system to ensure common benefits.

Mr. Cadbury has found that "the average yield per garden of one-eighth of an acre per annum, after making allowance for all out-goings, proved to be 1s. 11d. each per week. This gives a return of £59, 8s. 8d. an acre per annum. Thus the gardens, while providing healthful recreation to the cultivators, yield, as a result, a wholesome fruit and vegetable diet for the families free of all cost. This, it need not be pointed out, effects a very appreciable economy in the family budgets."

Another point in connection with these gardens is well put by a writer in the *Economic Review*. He says :—

"There are 43½ acres under cultivation, and at the ascertained average yield per acre of £59, 8s. 8d. per annum, this gives a total of £2585, 7s. per annum. Under ordinary methods of farming the yield was previously less than £5 per acre per annum—that is, the total yield of the 77 acres which are at present opened out used to be about £385 per annum. Thus, at the present time, these 77 acres produce more than six times the value of their former produce, and, in addition, at the same time, house, under ideal conditions, a population of nearly two thousand people."

But good as this is, it is for the children that I specially rejoice in the idea of the gardens.

"The cry of the children" has wrought many changes in the statute-book, and it is none the less influential if one knows from intimate friendship how many wrongs are endured without cries; how many sins of social omission are borne in silence, as if they were by eternal laws the birthright of "the lower orders."

The children of our large towns—how one aches as one thinks of them! Let us stand and watch them as they play in the noisy, dirty street. How stunted they are, ugly, half-washed, ill-nourished. It seems foolish to neglect the body, and thus make inadequate preparation for an adult life which must depend for its sustenance mainly on its physical strength.

"Look at those little chaps, how keen, alert, and independent, but their imagination is dwarfed or their games would be otherwise."

"What is that game?"

"Marble gambling."

"And this one which the girls seem to be enjoying?"

"That is school, with an exaggerated use of the stick."

"And that—what can it be?"

"Ah! no wonder you are puzzled. That is father coming home drunk and abusing mother. Sometimes the actors play it through, to mother's apparent injury, but on other occasions the next-door neighbour is called in to interfere, or the imaginary policeman summoned."

"But when that game is translated into bigger girls' fun it is perhaps most tragic. This is how the game was played at a club the other night:—

"'This,' said two big girls, 'is me and my lover'—and they walked about the room with entwined arms and clasped waists, illustrating many vulgar endearments. That ended, 'This,' they said, 'is me and my 'usband,' and they played a man roughly demanding service of the woman. 'And now,' they continued, 'this is father and mother,' and they commenced an imaginary fight, with screams and oaths. Oh! the pity of it! the horror of it in grim practice! the disgrace of it when treated as a game to amuse the young!"

In imagination let us transplant those children

into a garden, father working, mother watching, children helping, the land yielding with that generosity which under any climate seems to follow spade labour and personal interest. The pennies will not be needed for "sweeties" as the "goos-gogs" are enjoyed; the pickles will give place to the lettuces; the hastily obtained indigestible "relish" to the "vegetables we growed," and which is worth more than all the material advantages, the family will be able to take its pleasures together—the pleasure of preparing for, and tending, watching, hoping, and wondering about "the kindly fruits of the earth," which they will enjoy, and deserve to enjoy, "in due season."

The Cottages for the Wage-Earners

On two beautiful hills on the north-western boundary of The Hampstead Garden Suburb Estate, some 70 acres have been allocated for the cottage dwellings of those who earn their daily bread. The rents will vary from 7s. 6d. to 11s. 6d. per week, and the accommodation from self-contained cottages of three or five rooms to double-storeyed cottages of four rooms. The self-contained cottages will be such as can be seen on many estates, but the cottages for two families will be different in so far that the upper storey will be reached by an outside staircase under a deep eave, and will be occupied by the widow, the old, the working woman, or the seamstress who "cannot dig," and yet can enjoy the sense of air, space,

and peace which comes when a cottage is set in a garden. The care of the garden, with any profit which may accrue, will fall to the man who with his family will reside on the lower floor.

A considerable portion of this part of the estate will be worked on the principle of the Co-operative Tenants Housing Council, which by its organisation places within the reach of every member of the working population the opportunity of owning his own house.

The methods of the Society are briefly as follows :—

To acquire or erect substantially-built houses, provided with good sanitary and other arrangements for the convenience of tenants.

To let houses at ordinary rents; to pay a moderate rate of interest on capital; and to divide the surplus profits (after providing for expenses, repairs, depreciation, &c.) among the tenant members, in proportion to the rents paid by them.

Each tenant member's share of profits is credited to him in shares instead of being paid in cash.

The advantage to the tenant member is obvious, in that he is entitled out of the profits of a half-year to receive a dividend on the rent paid by him during that period.

But the system operates to the advantage of the capitalist, though the investing shareholder does not receive an excessive return on his capital.

(*a*) The greater the surplus profits, the greater the security for the regular payment of the interest

on capital. Now it is to the interest of the tenant members, who receive the surplus profits, to make those profits as large as possible, *e.g.*, by taking care of the property, and thus lessening the expenditure on repairs; by helping to find tenants for empty houses; by the punctual payment of rent.

(*b*) The Share Capital of the tenant members affords a fund upon which the Societies can, if necessary, draw in order to pay any arrears of rent. Loss by arrears of rent is therefore practically impossible.

"The work of this Society should," writes Mr. John S. Nettlefold, the Chairman of the Housing Committee of the Birmingham City Council, "prove of very great value. They get over one of the great deterrents to a working man owning his own houses, by allowing him, if he has to leave the neighbourhood, to get rid of his responsibilities in the form of shares, or he can, if he likes, retain his shares and receive his interest on them. This obviates the difficulty of being saddled with a house to let with repairs, &c., to pay for, or the possible worse contingency of being forced to sell in a hurry at a big sacrifice."

At the foot of the two hills on which the seven hundred cottages will be placed, it is planned to create a paddling pond, in which the sunset colours will be reflected, and where boys with toy boats and barking dogs can forget all but the gladness of life. Near by will be the Bakehouse, so necessary in an industrial neighbourhood, where money and labour both need saving. There will be also

Public Baths and common Laundries, and, I hope, an open Swimming Tank, close by a grassy Playground, where the children can frolic and the "Grannies" rest while the mothers work. We also plan to have allotments for those inhabitants who, occupying corner plots, are not able to have their gardens quite close to their houses; and also allotments for town livers, who will be able to hire the eighth of an acre at a six-months' tenure, wherein to cultivate vegetables and flowers, thus making use of the land pending development, to its improvement and the people's happiness.

Associated Dwellings for Working Ladies

It is the essence of the scheme that "all sorts and conditions of men" should find homes in the suburb, and so, among the ideals which time may see realised, is the establishment of Associated Dwellings for working ladies.

Those of us who know the domestic lives of the ladies who, as teachers or typists, earn their own bread, and who by circumstances are prevented from living with their families, know that the conditions of their non-working environment leave much to be desired.

In the Hampstead Garden Suburb it is proposed to build an Associated House round a common garden or tennis-court, which all can enjoy. Each lady will have one or two small bedrooms and a larger sitting-room, while there will be a common kitchen, a drawing-room, and a library, in order to

ensure good co-operative meals for the body and better food for the mind than those who have to consider every penny are often able—however desirous—to supply individually. The Association House will be built and conducted entirely on a sound financial basis, so that no lady will feel herself degraded by the acceptance of charity, or obliged to incur obligations which would be repugnant either to her refinement or to her self-respect. The first Associated House has already been planned. It looks charming, and will be convenient. The rents will range from 7s. 6d. to 10s. 6d. a week.

The Non-Charitable Almshouses

How many of us know the mothers of our servants, the "moral aristocracy of the poor," who, perhaps supported by a small pension or the loving contributions of their dutiful children, are yet compelled to live in the sordid, crowded quarters of the town, though their age and characters demand that in the late afternoon of life they should pass their few remaining days where they can see the sun set and hear the birds sing.

Such people as I have in my mind are not fit occupants for Almshouses. They need all the grace and seclusion of such houses without the alms and its inalienable stigma. So one of the hopes of the Garden Suburb Trust is to meet this need by building a paying Almshouse, where each loved widow or old couple can have their room, their "bit of garden," and the larger common sward

where to meet, gossip, and hearken to Nature's voice, which seems to tell deep-seated secrets to those who have travelled far on life's hard high-road. Very gratefully has the idea been already received by those who support their aged, and who regret, as conditions now are, that in spite of all that their love can do it cannot surround them with what they feel their age and their efforts and experience would warrant them in possessing.

The Scheme is on a Financial Basis

As I write it seems to me that these plans will tend to make people believe that the scheme is one for philanthropic effort, and that the majority of its acres will be devoted to the cottages of the working classes and institutions for the handicapped. But such a development of the estate would be to nullify one of its aims, which is so to plan the estate that there may be room and amenities for all classes.

Out of the 240 acres available, 55 are put aside for roads, 70 for the industrial class cottages, 30 for the villas of clerks and persons who can pay from £30 to £60 yearly rent, 40 for shops or for the houses of the annual value of from £60 to £100 per annum, 30 for houses of such yearly rents as will justify ground rents of £100 per acre, and 15 for even more expensive habitations. The houses will be built either by individuals or Co-operative societies, or by a subsidiary Company; or, if sufficient capital is forthcoming, by the Loan Fund

of the Garden Suburb Trust Company, or by any other capital that can be obtained by would-be tenants. Perfect freedom will be allowed to individual taste, with the proviso always that no one building should spoil his neighbour's outlook, that the appearance of uniformity should be avoided, and that only a proportion of every plot should be covered with building, the heights of which must be rigorously limited, or huge flats would arise, such as already disfigure a portion of the eastern Heath, and once more the amenities of the whole would be sacrificed to the greed of the individual. Very beautiful are some of the views to be obtained from the higher land overlooking the newly-acquired 80 acres of open space, and already the wealthy have shown their appreciation of such spots. Facing south and west the land slopes upward to the wooded heights of the upper Heath, and downward across Golders Hill and the undulating country to the horizon, on which rests Harrow on its Hill, ever an interesting object amid the sunset lines. For the enjoyment of these views high rents will be paid, and the close proximity of the new electrical tube railway will bring the homes of city workers very near to their offices.

Public Buildings

On the summit of the central hill, rising some 420 feet above sea-level, an unwalled space of five acres will be set aside for the public buildings —the Church and the Chapel, the Lecture Hall and

the Library—in the plan the contours have been so considered that these erections—beautiful, it is to be hoped, each with its own distinctive beauty—will be able to be observed from all parts of the estate, up the long tree-planted boulevard, across a children's playground—from that cluster of trees grouped on a neighbouring hill, by those acres of allotments, it will be possible to obtain, if not a full view, yet a suggestive glimpse of the buildings which will be, it is hoped, "the gathering place of souls" and memories, which will, like the uniting love of gardening, be the common links binding all classes in kindly communion.

But enough has been said to enable my readers to imagine the suburb; the point that I would enforce is that its creation follows the lines of scientific development. The condition of the people has aroused national interest. That interest has traced many evils of the condition to the unfit houses. Experiments have been made in providing houses, but now closer inquiry into causes has shown that other things must be considered beyond the mere provision of accommodation. People cannot "live on bread alone." They need the stimulus of various interests, contact with nature and the neighbourhood of other classes to stir their minds and aspirations. Houses, if they are to be Homes, must be other than in long mean streets, they must have gardens and a view, and they must be so placed that the inhabitants may form a Community strong in its variety of classes and interests.

Hopes for the Future

The suburbs, that is to say, of great towns, must be garden suburbs laid out with the knowledge put at the disposal of this generation. The experiment of which I have written will only be successful if it proves the practicability of the scheme, so that other like extensions may be made, and later, some legislators desire that a law may be passed, permissive in its character, but which will enable a Municipality at any rate to prevent the unscientific growth which has marked recent years. The vexed question whether Municipalities should themselves be builders need not here be considered; the important matter is that the authority should prevent individuals doing what experience condemns. The Municipalities of the future, seeing the attractiveness of the Hampstead suburb, the healthy happiness of its life, its strong position as a paying concern, will, it is hoped, be led on to secure powers that other town extensions may be ordered on similar lines. Cities must grow. The progress of mankind is from the Garden of Eden to the City of God. Cities must grow, but it is the gift of science that the growth may be so directed that the citizen may have both the inspiration of a garden and the stimulus of a living community.

SCIENCE IN NATIONAL EDUCATION

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"Whether it is not a great point to know what we would be at? And whether whole states, as well as private persons, do not often fluctuate for want of this knowledge?"—BERKELEY, *The Querist*, 1737.

I

THE English attitude towards State education has for generations been one of hesitancy—hesitancy hampered by an inheritance of half-measures. This hesitancy has been due to many causes, but to one in particular, namely, an inner conflict between social ideals which happen to have been associated with different shades of religious belief. That such a conflict should affect educational questions was inevitable, seeing that education (what is done in schools being but part of the process) signifies training for social efficiency; and in judging what does, and what does not, make for social efficiency, we necessarily appeal, however vaguely so far as words are concerned, to a social ideal. Social efficiency, which is the

object of education, implies not only physical well-being and technical aptitude, but a moral purpose and a readiness to forego, if need be, personal ease in defending or establishing a certain way of life. During the last fifty years, however, a great intellectual movement, by its influence upon customary habits of thought and by its practical applications, has gradually wrought a signal change in social ideals. The purpose of this paper is to discuss some of the chief bearings of this intellectual movement upon the problem of national education in England.

Within the United Kingdom there are virtually four systems of national education. Each has its own history, its own problems and its own needs. The psychological background, which in matters of education is of determinative importance, is in great measure different for each. No single Minister of Education superintends the whole, though the administrative ties which connect a great part of the Welsh system with the English are at present closer than those linking English and Welsh education to Irish or Scotch. All four systems are, it is true, affected by the fiscal considerations which determine the Budget common to the whole of the United Kingdom. All four, though in different degrees, are influenced by the balance of political forces in the Imperial Parliament. All four are sensitive to the intellectual and economic influences which shape the course of imperial policy, and to the great changes wrought in the mental and spiritual outlook of men by the advance of knowledge with

its resulting applications to the mechanism and opportunities of daily life. All, again, are somewhat connected, in the more advanced stages of instruction, by the attendance of students from the various parts of the United Kingdom at the great Universities, at the most important technological institutions and at some of the non-local secondary schools. But in spirit and tradition, in the balance of controlling influences, and in the prevailing attitude of mind, the educational systems of the four parts of the United Kingdom are markedly unlike. Each makes its characteristic contribution (and in the case of England and Ireland, especially, more than one contribution) to the educational life of the whole. Of the four the Scottish system is the most homogeneous, the Irish the most divided, the Welsh the most enthusiastic, the English the most complicated and various. As has been well said: "We can see England, businesslike and unphilosophical, somewhat lethargic in her prosperity, slowly realising first the commercial advantages of education and then the possibility of applying scientific methods to the process: great in self-government, yet delegating to the localities only those powers which she intends them to use; making a working compromise at every step, and triumphantly disregarding consistency in details: strong in her sense of duty, greatly proud of her ancient institutions, liberal in grants once her hand is opened. There are Wales and Scotland to whom education is far more dear: Wales, in a newly-born fervour for knowledge, producing, as it were

by magic, order out of chaos; Scotland, thrifty, prosperous and wise; with an ecclesiastical history 'the most perverse and melancholy in man's annals,' yet without a religious difficulty in her schools; having taught her children for centuries past to mind their book and get on in the world, and to be independent and upright—a lesson well learned at home and practised with great success abroad. Last comes Ireland, poor and in subjection; passionately attached to her faith; lovable and unreliable and helpless; the child among nations: the Celtic genius mysterious and unpractical, 'always bound nowhere under full sail,' abandoned for long to obsolete methods and inadequate instruction, because reform meant the calling up of many quarrels."[1]

We in England began late to organise education on anything like national lines. Our system is still weak in national spirit. But provided that we move energetically forward with our half-finished work of educational reform, there is no reason why in fifteen or twenty years' time we should not have one of the best educational systems in the world. We can take advantage of other people's experience and avoid their mistakes. But it takes a long time for the influence of a good educational system to permeate the life and thought of a nation. And we have given Germany and some other countries a long start. It must always be remembered that the state of

[1] Graham Balfour, "The Educational Systems of Great Britain and Ireland," 2nd ed., pp. xiii.–xiv.

mind which habitually favours concerted action on scientific lines is the outcome of a system of general education which has had plenty of time to leaven the intellectual life of the community concerned, which has been inspired by a sense of national duty, and which has been intelligently disinterested in spirit, and not been spoiled by utilitarian narrowness and by specialisation in the wrong place. It is in the skilful adjustment of educational means to national, as distinguished from sectional or private, ends that we have allowed ourselves to fall far behind. Our general system of public elementary education is still under forty years old, and for a considerable part of its history suffered grievously from the bad tradition of payment by results. And, though immense improvements have been made in them during the last ten years, our middle secondary schools are still (with numerous exceptions) inferior, in point of staffing and intellectual grip, to the average German, Dutch and Scandinavian schools of the corresponding type. Therefore we cannot yet expect to see in the community at large the same habitual readiness to welcome and understand plans of scientific co-operation for public ends (in such matters, for example, as the hygienic control of the growth of towns, the organisation of agricultural industry, and the establishment of closer connections between scientific research and industrial enterprise) which already forms so striking a characteristic of German and Danish life. But we have only to persevere in the work of educational improvement which we

have already well begun, to reach in due time and in our own way the state of public opinion favourable to the scientific organisation of national resources, alike for civic well-being, economic development and national defence. The building-up of a national system of education is like the planting of woods. As Bacon said, "You must make your account to lose almost twenty years' profit and expect your recompense in the end." We are apt, I submit, to be far too easily discouraged about our educational resources in England. Disliking boastfulness as bad manners, we slip into undue depreciation of what is in reality full of promise for the future. It is no easy task to get a comprehensive outlook on English education and to judge the progress which is really being made. Far behind as we are in many ways, urgent as is the need for improvement in many respects, there are abundant signs of life everywhere. In German education, in American, in French and in Scandinavian, there are many admirable features which we may profitably study and from which we may gain suggestions. But, when all is said, no single foreign system is so good, through and through and in all its social implications, that we should seriously wish, even if we could, to set it up in England in place of what we may develop out of our own educational resources. What we should do, I submit, is to watch and study educational improvements in other lands, and not less in our own country, and to move steadily forward on English lines, looking always

thirty years ahead, and keeping the social needs of the future constantly in view. Of everything really efficacious in national education the growth is slow. It is not the machinery that matters so much as the public attitude of mind. And this is the chief thing to influence through education.

This being said by way of preface, it may be added that our most serious weakness in England is our unreadiness to co-operate scientifically for great social ends and to submit voluntarily to the sacrifice of individual preference which such co-operation necessarily entails. Originality, enterprise, character, genius, goodwill—of these there is much, and our educational freedom has had something to do with fostering all of them, but of scientifically concerted action on voluntary lines for collective social ends, there is comparatively little. The education of the middle ranks of the community is chiefly to blame for this. It is too little touched by the spirit of national organisation. It is too individualistic and sectional in aim. "Getting on" is too much its ideal. There is too little thought in it of "getting things done" for the whole community, and of deliberate preparation for concerted endeavour to secure social organisation on more scientific and less wasteful lines. In no country is more voluntary labour devoted to matters of public concern; in none is more of it wasted and weakened by duplication and division of effort. In no country is there so much benevolent and self-denying activity in coping with the evil consequences of social dislocation, and

so little disposition to think out and to deal trenchantly with the causes of it. In a scientific age our social organisation remains pre-scientific. Its aims are undefined; the relationship between its different parts is left vague and loose; conflicting purposes and tendencies half unconsciously counteract one another; there is a welter of wasteful competition tempered by good feeling; and palliatives are applied by a thousand charitable agencies running at half-power. Will this be changed by the scientific movement, which in its influence on thought is the outstanding characteristic of modern life and the most powerful factor in determining the present course of human effort?

II

It will be agreed that the scientific movement, in the wide sense of the words, has four chief aspects. It has increased with extraordinary swiftness man's knowledge of Nature through the systematic application of scientific methods of inquiry to the phenomena of the material world. Secondly, through the practical application of parts of the knowledge thus gained or deepened, it has greatly changed the conditions of human life, chiefly through improvements in methods of production, through the increase and quickening of means of communication and through the strengthening of resistance to disease. Thirdly, it has led to, or been accompanied by, the application of new methods of inquiry and criticism to the subject-

matter and mutual relationship of all other branches of knowledge, especially those connected with the development of human life and thought and with the growth of institutions and beliefs. Fourthly, by changing the contents and perspective of thought and by indicating the connections between things which were habitually regarded as independent of one another, it has profoundly affected, though in very different degrees and in different directions, the individual outlook on life and the general attitude of mind towards questions concerning society as a whole.

It goes without saying that an intellectual movement of this magnitude, rich in practical consequences and touching at all points thought and life, must have a profound effect upon education. For education is partly a deliberately controlled adjustment to life and partly an outcome of the multitudinous experiences which life itself brings.

The scientific movement has affected education in four ways. First, it has compelled a great change in the ordinary programme of school studies. It has been necessary to readjust curricula to the new knowledge of nature. The one section of English education which has not yet been fully touched by this new spirit is that represented by our higher secondary education for boys. The prevailing linguistic tradition has still too tight a grip on the preparatory schools (age 10–14) and the teaching of science, though well represented at the great Public Schools, is not yet a necessary ingredient in every boy's work. But it is only

a question of time for the new knowledge to win its place in the customary training of all young people. Speaking generally, natural science has made a far-reaching change in the course of studies in English schools.[1] In some cases, indeed, its claims have been pushed so hard as to defeat the purpose of scientific education by depriving the pupils of their necessary training in other subjects and especially in the power of expression in their own language. But this error is now realised and educational authorities are correcting the balance of studies. What is most to be aimed at is not the premature accumulation of scientific knowledge, but the cultivation of an attitude of mind which is interested in the study of nature, and the training of the habit of accurate observation and of the power of investigating the relation between cause and effect. It is generally agreed that Burke was right when he said that "the method of teaching which approaches most nearly to the method of investigation is incomparably the best, since, not content with serving up a few barren and lifeless truths, it leads to

[1] In every English secondary school receiving grants from Government, science must be taught (not less than seven hours a week being given to science and mathematics, of which at least two must be science). The course in science must provide for practical work by the scholars. In every English public elementary school, observation lessons and nature study must be taught, with special reference to the surroundings of the scholars and to the natural features, industries and plant life of the locality, with a view of forming the habit of intelligent and accurate observation.

the stock out of which they grew: it tends to set the learner on the track of invention and to direct him into those paths in which the author has made his own discoveries." Englishmen have been conspicuous among those whose writings have won the battle for physical science and for inductive studies in school work—Herbert Spencer, Faraday, Tyndall, Huxley, Ruskin and, in later years, Professor Armstrong. Nor should it be forgotten how much, in spite of the too one-sided pressure of its influence, the Science and Art Department did in securing a place for natural science in English education.

In the second place, the scientific movement has necessitated new forms of educational equipment for life. The professional and other callings which involve scientific knowledge have very rapidly increased both in number and in influence. Hence has come about the development of the scientific sides both of the old and new Universities and the growth of technological instruction in all its grades. In this movement the lead was taken more than a century ago by revolutionary France,[1] and followed by Germany a few years later.[2] In England we lagged far behind, and it was not until the middle of the nineteenth century that effective action was taken, largely under the influence of the Prince Consort,

[1] See Liard, *L'Enseignement Supérieur en France*, 1789–1889, pp. 259 ff.

[2] See Twentyman, "The Earlier History of the Technical High Schools in Germany," in Special Reports on Educational Subjects, vol. ix. pp. 468 ff.

to give State encouragement to scientific education for industrial purposes.[1] The chief reason for our backwardness had been unwillingness to entrust great educational powers to the State. Adam Smith's teaching, while favourable to the public organisation of elementary education, had been strongly opposed to State action in higher instruction.[2] And the new industrial forces, which were steadily rising to power in England through the effects of the Industrial Revolution, had been distrustful of the ecclesiastical influence which, they believed, would gain fresh authority through any wide extension of State activities in education. Moreover, the English Government was far less directly interested in branches of industry (mining, forestry, communications) than was the German Government, and, therefore, was under no necessity to train officers for its own industrial purposes. When the movement for scientific and technological training did begin in England, it was not realised that technical education in its higher grades must rest upon a sound basis of general secondary education, and, similarly, that technical education of a lower grade requires as its foundation a thorough and comprehensive elementary education. With us, attempts were made to put up the roof before the supporting walls were ready. The extraordinary success of higher technical education in Germany has been due to the

[1] See Fabian Ware, "Educational Foundations of Trade and Industry" (Harper, 1901), pp. 29 ff.

[2] "Wealth of Nations," Bk. V. chap. i.

fact that its work rested upon what is, intellectually speaking, the most carefully organised system of general secondary education in the world.

The third consequence of the scientific movement has been to breathe a new spirit into educational aims and methods. No writer did more to infuse this new spirit into modern teaching than Herbert Spencer, whose essay on Intellectual Education, published in 1854, was imbued with the principles of Pestalozzi. At bottom, it is the spirit of search as contrasted with the spirit of "believe and ask no questions." But, as Spencer said: "There cannot fail to be a relationship between the successive systems of education and the successive social states with which they have co-existed. Having a common origin in the national mind, the institutions of each epoch, whatever be their special functions, have a common likeness." At the time when he was writing, scientific inquiry was battling against entrenched prejudice. Therefore, to his mind (and similarly to Tyndall's and to Huxley's) scientific teaching seemed inseparably connected with discovery, with the overthrow of false authority, with liberation. But it is quite conceivable that in future, when physical science sits on the throne of undisputed authority, she may wittingly or unwittingly impose upon education as heavy a weight of prescribed belief as did any earlier régime, and may come herself to need, as an educational corrective, the sound doctrine of her earlier protagonists. All true education strikes a balance between

authority and independent search, a balance for which there are no set rules, but which the tact and insight of the true teacher establish afresh for each mind according to its needs, to its stage of development and to the circumstances of its work. It is therefore expedient to have at all times a due place in education for that subject, or group of subjects, in which, at the time, the most strenuous movement of inquiry and investigation and the keenest revisal of old conclusions are going forward. The spirit of search is caught from teachers who are themselves searching; not simply by artificially reproducing the methods of search in provinces of knowledge which are enjoying the peace of unchallenged acceptance.

The greatest educational service which the scientific movement has rendered is in emphasising certain principles which should guide the teacher in his methods of work. These are that the physical side of education is basal to mental and moral training; that child-nature must be studied in order that all instruction may be adapted to the learner's stage in mental development; that sense-perception and practical work should have a place, though not an exaggerated place, in all education; that the latter should, as far as possible, be a course of self-development; that the course of study, while enforcing accuracy, patience and endurance of discipline, should also cause a due measure of pleasurable excitement in the learner; and that the teacher should endeavour with all his power to train his pupils in the habit

of tracing connections between cause and effect, and to inspire them with a real desire to get to the bottom of things. Thus the fundamental issue is that of truthfulness—easy to speak about, most difficult of all things to practise in some of the intellectual questions with which the teacher deals and in the circumstances in which the teacher has to work. And yet the touchstone of the noblest, and of all memorable, teaching is unflinching veracity. This it is that forms character, because it is the expression of the sincere character of the teacher—character, as Goethe said, forming character.[1]

The spirit of the scientific method spreads, of course, far beyond the teaching of the physical sciences. Mr. Spenser Wilkinson, to whose unflinching thought on national questions a great debt of gratitude is due, has recently pointed out the influence of the scientific method upon classical studies. The following passages are quoted from an article contributed by him to the *Morning Post* of November 24, 1905 :—

"The change required in the public schools is not, as some people suppose, the substitution of a scientific for a classical curriculum. It is a change in the spirit governing the instruction given. . . .

". . . The old academical training, with its accurate scholarship, its habit of concise thinking, its assimilation of Greek thought, of Roman statesmanship, and of Roman law, turned

[1] "That fanaticism of veracity, a nobler gift than the power of increasing knowledge, by so much greater as the moral nature of man is greater than the intellectual; for veracity is the heart of morality."—T. H. Huxley, "Life and Letters."

out powerful and generous minds. No one wishes to lose anything of that result, and no one who appreciates it can undervalue the means by which it was attained. But the young men who, with this kind of attainment, were turned out at two-and-twenty into the world were not in touch with it. The region in which their minds had been developed was the ancient world, dead, no doubt, to the practical man, but in spirit at least still living for these young men. The world into which they emerged on leaving the University was a very different world from that of Pericles, Aristotle, or Cæsar. Instead of being bounded on the north by the Danube and Hadrian's Wall, and on the south by the Sahara, it covered the whole surface of a planet revolving in infinite space. Its men of knowledge, the true successors of Aristotle and Archimedes, had weighed and measured it, had ascertained the laws of its stability and of its movements, had traced its genesis and found out what it was made of, had explored the structure and the growth of all living things. This new world, so different to that known to the ancients, was full of steam engines and electrical machines, of factories and of their workpeople. These workpeople were not slaves as in that old world, but free men, respecting themselves, believing they had as good a right as any senator to take part in affairs of State. The man of classical training, in spite of his well-developed powers, found himself a stranger in this new world. Its engines were a mystery to him. Its natural laws he had to learn from all sorts of aliens to his intellectual experience—persons calling themselves engineers, chemists, biologists, and geologists—with whom during his academic life he had had only a nodding acquaintance. The link was wanting between the world of his books and the real world, the only clue which he possessed being the identity with itself of the human mind and the human character in the two worlds between which he was placed, the world of his old books and the world of his new surroundings.

"Such was the contrast which existed thirty or forty years ago. Since then it has been mitigated, so that the description just given may now seem to be exaggerated, but the contrast still exists. It has to be altogether obliterated. How that is to be done may best be seen by considering the process by which the gulf which has to be filled up has been bridged. What has

happened has been that during the controversy between the representatives of the old academic life and those of the new knowledge each set has learned something from the other. . . . The lesson which the naturalists have taught to the classicists is that no department of life in a past age can be fully understood except by the man who has mastered that department of life in the present, and therefore that the methodical knowledge of the world which is called science, so far from being antagonistic to a due appreciation of the ancients, is one of the keys by which the ancient mind can be unlocked. One special branch of modern inquiries has profoundly influenced the whole range of classical studies. It is that of comparative grammar. The discovery of Bopp that the Greek and Latin languages are identical in the main lines of their structure and the bulk of their substance with the language of the Vedic hymns and the exposition first carried out by Jacob Grimm of the growth of all the modern German or Germanic dialects from the same original stem showed Greek and Latin scholars that the languages with which they were dealing were to be regarded not as edifices of finished structure like a Pyramid or a Parthenon, but as living organisms, and therefore passing through the perpetual changes of growth and decay. Thus the idea of evolution made its way into the domain of classical scholarship, in which it fertilised and regenerated every department. To-day this idea and the historical method which is inseparable from it are the common property of both parties. The naturalists have come to admit the justification of the study of ancient life, and the humanists to see that their ancient world, with its languages and literatures, becomes more intelligible and more interesting when regarded from the point of view of growth, that is, as a living thing.

. . . . . .

"There is no limitation of studies by the time and place of the subject. The purpose of them all is the same—to enable us to know ourselves and the world we live in. The moment that the Greeks and the Romans are studied with that purpose they cease to be mere bygone peoples and have a living interest. The schoolmaster's function is to introduce the boy to the world and to life. Provided he will do that, neither the practical man nor the naturalist will carp at his choice of subject.

But if he is to succeed two things are necessary, the first that this purpose should be ever present to his mind, both when he frames his curricula and when he gives his lessons, and the second that it should be brought home to the boy's mind. The conception of the school as a glass house from which the boy sooner or later is to be let out into the open air, or of education as a process which is going to be finished at a particular date, as girls used to be 'finished' before they went 'out'—this is what has to be got rid of."

The fourth consequence of the scientific movement in thought which has affected education is the change which it has brought about in the conception of national life. Partly by suggesting the analogy (it is at most an analogy) between the organism and the State ; partly through the practical changes which it has produced in the mechanism of social life, in methods of warfare and in the direction of economic activities, it is familiarising us with the idea of a scientifically organised national existence. The argument of Hobbes is re-stating itself in modern terms. It is conceivable that much of the authority of science might one day be found on the side of those who would curtail with the utmost severity, not freedom of action only, but freedom of speech and of teaching, in the alleged interest of the State. That, if it comes, will be an evil day — evil because it could only come after some great disaster or peril due to previous want of national foresight. But such distant danger as there is of a repressive government of national defence buttressed by science, can be best averted by a kindling of educational effort so as to produce in all ranks of

the people a high form of individuality trained to realise its aims through voluntary subordination and through co-operation in definite plans for national welfare.[1] A strong sense of individuality is the salt of true nationalism. The new state of things which has come about through the practical applications of science calls for heightened individuality as well as for a heightened sense of nationalism—the nationalism which does not bluster, but which aims at greater efficiency in international relationships. The two are complementary to one another, and safety lies not in their being opposed (as would happen if one lagged behind while the other grew) but in that equation between them which it is the chief business of education, viewed as a political and social influence, to produce.

It is the instinct, perhaps, that great reshapings of national life are drawing near which has caused one of the most striking results of the scientific movement to be the reorganisation of national education in many lands. Germany has gone the furthest in this development of State education and in the authoritative enforcement of its claims. No one can study the German system of educational administration and the work of the German schools without profound admiration for the precision of aim, the learning, the teaching skill, the patient attention to detail and the constructive power

[1] For this reason it is, I submit, expedient that careful physical training, leading up to volunteer service with arms, should be a part of every youth's education.

which they reveal. Behind the whole system lies the idealism of German thought, its long culture, its self-denial, its high purpose. Without these things modern Germany could not have been. And yet, can we see without concern the darker side of the German educational system, its lack of spontaneity, its bureaucratic character, the over-pressure of studies in the higher schools, its weakness on the side of physical activities and of education as distinct from instruction, its over-intellectualism?[1] As the Kaiser is reported to have said, the truth lies between German education and English. Yet how inextricably involved is a highly organised State system of education in its own machinery, with what difficulty does it escape from its own traditions, in spite of the strenuous efforts of its directors, who earnestly desire to secure greater freedom from over-pressure and to develop those sides of school life which make for self-government and self-controlled independence of action.

We in England are still only on the threshold of the new régime. What form is that régime likely to take with us? We cannot refuse to strengthen the hold of the State upon our education. Irresistible forces drive us on. We are in the suck of a strong current. Act we must, because other nations with whom we have to compete, not only in the sphere of industry and commerce, but in the more momentous struggle

[1] See Gurlitt, *Der Deutsche und sein Vaterland* (Berlin, Wieland und Grieben).

between national ideals, have thrown themselves with all their energy into the work of educational reconstruction. The result of their efforts may not be wholly to our taste, but we cannot disregard them, because they are changing the emotional and intellectual conditions of the world-struggle in which we are compelled for sheer existence to bear our part. It is well, therefore, to consider whether the scientific movement, with its intellectual and practical implications, has so far shifted the centre of educational need as to open up a free course for united progress in English education, aside from the embarrassing controversies which have for so long hampered our advance.

May it not prove to have done so by making two changes of far-reaching importance in our point of view? In the first place it has thrown an entirely new emphasis upon the physical side of education. We realise far more vividly than heretofore the interdependence of mind on body, the dangers of mal-nutrition in infancy, in childhood and in adolescence, and the vital importance to the nation of securing the healthy physical development of the young. Not long ago it was possible for the elementary education question to be discussed as if it were concerned only with instruction and rudimentary mental discipline, with manners thrown in. Now, through the influence of scientific habits of thought, the physical aspect of the problem is beginning to stand out in strong relief. The evils of overcrowded homes, of wrongly fed and underfed school children, and

of the lack of proper physical training, are connecting themselves with the other questions of education in such a way as immeasurably to increase the urgency and social significance of the whole problem. When it is fully realised that the physical well-being of the nation is at stake, and that safeguards against degeneration must be found in a systematic social policy, of which educational influences and well-planned school training form an indispensable and integral part, sectional jealousies in the management of elementary schools will be overborne by a clear conviction of national necessity.

Another effect of the scientific movement upon educational thought is not less penetrating. It has given a new significance to the study of child nature and of the psychology of childhood and adolescence. The investigations to which this new turn in educational thought has led have been fruitful already, but are still in an early stage. "A true educational science must be inductive, must be made up from the study of the particular facts in answer to thousands of different questions. The science of education when it develops will, like other sciences, rest upon direct observations of, and experiments on, the influence of educational institutions and methods, made and reported with quantitative precision. Since groups of variable facts will be the material it studies, statistics will everywhere be its handmaid."[1] But the influence

[1] Thorndike, "Educational Psychology," p. 164. (New York, Lemcke and Buechner, 1903.)

of scientific method in the study of the psychology of childhood has already pushed into the limbo of superstitions the old idea that abstract catechisms can convey a vital sense of truth to tender minds. The fancy that if only the catechism were taught all would be well, has had more influence upon the political fortunes of English elementary education than we can now easily realise. The new way of thinking of children's minds as things that develop, and which therefore need different methods of approach at different stages of their development, has quietly made much of the old controversy uninteresting and obsolete. The question has taken a new form, and the old mechanical solutions will steadily drop out of debate.

Add to these two changes a third, and the newness of the situation is plain. Scientific methods of inquiry have demonstrated the critical importance of the early stages of education. The teaching of little children was, not long ago, thought of as a business that might well be left to any old woman or crippled man. But steadily the fact becomes plain that it is precisely for the beginners that you need the most skilful and some of the most cultivated teaching, not because erudition is to be poured out upon them, but because they need to be imperceptibly led to see relationships between things, and because only those who have themselves a cultivated knowledge of many subjects are qualified to answer their questions as they should be answered, and to guide them without

overpressure and without premature detail to right habits of thought. It follows from this that the teacher's calling, from the elementary school upwards, is rising fast in its professional status. It needs a liberal education as a necessary part of its equipment. And, as this becomes clear, the old relationship between the clergy and the elementary school teachers becomes irrelevant. A new relationship, not less cordial but on quite a different basis, will take its place.

III

In every country a number of underlying conditions affect the problem of educational reform. Some are psychological, others economic. Each group affects the other, but of the two the psychological conditions are the more difficult to analyse and yet at least as dangerous to disregard. When the subtle implications of educational influence are kept in mind, when we remember how intimately connected it is with home life, individual judgment, belief, manners, taste, social organisation and national aims, we realise at once that an educational system is not a thing like a system of electric traction or gas lighting, which can be reproduced at will in one country or another according to the progress of invention and of scientific skill. The roots of an educational system go deep into the past. Its form is determined by historical and social conditions which cannot be ignored, though the latter may in time be changed

by it. It must take account of the strong points in the national character as well as of the weak ones. It must be congenial to the national temperament. *Il faut être tout à fait de son pays pour être quelque chose.* And yet a national system of education must also have regard to the spirit of contemporary thought which is an international thing, and to the economic situation which again is the resultant of the needs and efforts of many nations.

May we not say that for hundreds of years four things have been noteworthy in the English way of approaching great affairs which touch the central interests of national life? First, a decided preference for free speech, for the right of saying what we think, and a willingness to do by our own free consent much that we should stoutly refuse to do in obedience to rough command. Secondly, an instinct, rising to political genius, which warns the people when the time is drawing near for a great change in the nation's course of policy towards the rest of the world. Thirdly, a readiness to listen for a long time, before taking the determinative step towards a great change in policy, to what can be said against the change as well as to what can be urged in favour of it. Fourthly, when the moment for final decision has come, a determination that, be the wrench what it may, sectional and vested interests shall give way to the national interest, without regard to logical symmetry, but very rarely with any vindictiveness in curbing minorities beyond the point

thought necessary to secure the safety of the new national policy, and with still less disposition to exterminate minorities in the hope of destroying their future return to power. The four things depend on one another. We have enough national solidarity to allow ourselves plenty of individual freedom. We believe that through keeping itself open to new impressions (which involves preserving variety of temperaments and points of view) the nation will remain sensitive to the conditions which point to change. We have experienced the practical benefits which come through free discussion and from allowing new views to be frankly stated and then sifted by criticism. We admit the weight of argument on both sides of all great questions and doubt the practical wisdom of enjoying unanimity at the price of the expulsion of dissenting minorities. We keep in our armoury varying precedents which can be used to give historic continuity to more than one course of public action. And yet the bottom fact of all is national solidarity, strong enough to dispense with uniformity, persisting through endless disputes, and always emerging at times of real crisis.

If it is true that these are national characteristics, will it not be wise to take them into account in English educational reorganisation? The besetting fault of State systems of education is their tendency to interfere with the free expression of individual conviction. They hush up questions which may stir controversy, but in regard to which

frank discussion is healthier than insipidity and loss of interest. Stubborn personal opinions are like grit in the bearings of the machine. State education of the bureaucratic type resents opposition. It tries to freeze out private effort. It is intolerant of competing claims. In all these respects it is repugnant to the genius of English life, though not necessarily repugnant to some of the sections of which English life is composed. Will it not be prudent, therefore, to devise for England a kind of State education different from the pattern adopted in other countries which are sometimes held up to us as models for our imitation?

In one of her books on West Africa, Miss Mary Kingsley made the remark that "a careful study of the things a man, black or white, fails to do usually gives you a truer understanding of the man than the things he succeeds in doing." If this applies not to individuals only but to nations also, it is worth while to consider why England, in so many other forms of social effort a pioneer, has been but slow in organising her State system of education. Of the many reasons which may be cited for this backwardness (some of them, it must be admitted, intellectually discreditable, others much the reverse) I believe the fundamental one to be this. At each great crisis in educational policy the thinking and politically influential classes in England have been more equally divided in their convictions as to the type of citizen which it was expedient to produce and as to the civic aims which it was

desirable to inculcate, than was the case at times of corresponding opportunity in the other lands to whose scientifically planted State systems our free-growing English institutions form a picturesque but rather costly contrast.

With us, at the critical moments, neither side has been strong enough to gain the power of enforcing its own ideas through the educational organisation of the State, though both sides have been in turn pretty strongly of opinion that some effective organisation of national training there ought to be. It must be remembered that claims to a complete control of our national education have been advanced at different times by thinkers of quite opposite opinions on the religious and political questions of their day. Neither Anglican nor Puritan, neither the National Society nor Robert Owen, neither the supporters of denominational schools nor the Birmingham League, were strong enough to secure for their own educational ideal the sole sanction of the State. The result has been an untidy sort of compromise. We have taken such action as our differences allowed. Some illogical monopolies have been allowed to remain. What has been done has no pretence to symmetry. It makes any economical concentration of power impossible. It divides many who ought to be working together. It is so intricate that the ordinary citizen cannot understand the relations between one school and another, and the whole system fails in consequence to make a clear appeal to national pride. Moreover, there is such a

multiplicity of institutions that we keep most of them in a state of chronic anæmia.

Much of the bitterness of this long conflict has been due to an exaggerated idea of what teaching in day schools can do to control the subsequent beliefs, as distinct from the general attitude of mind, of the children concerned. It is too often taken for granted that, whatever be the psychological conditions outside, certain lessons given in day schools not only leave an indelible mark on the mind, but furnish the basis for definite adult belief. The facts do not confirm this assumption. The saying that "whoever controls the schools, controls the next generation" is not borne out by experience. Those who from profound religious conviction and a sense of missionary duty have assumed that partial control of the elementary school system was indispensable to the influence of the Church upon the next generation, seem often to base their view upon *à priori* reasoning and not upon a dispassionate examination of the actual facts. Schools can do a great deal, but they cannot withstand the spirit of the time. The wind bloweth where it listeth. Under the conditions of modern life, religious truth has everything to gain from freedom and much to fear from official association with irritating forms of control. Where the teaching of the school is in harmony with the disposition and temperament of the child and of his home circle, it deepens and fortifies conviction. But it can do little against the influences of life outside, especially the influence of the home, if

those be in revolt against what is taught in the school. It may indeed produce conformity for so long a time as it is advantageous to conform; it may produce polite indifference or evasion; but impose a given body of opinion upon the adult citizens of the next generation, this—unless it has behind it the whole spirit of the community—it cannot do. One of the chief results of the scientific study of education is to show that, great as is the power of the school, it cannot enforce an intellectual or a spiritual monopoly. Our best hope, as it seems to me, lies in deliberately giving up any attempt to enforce ecclesiastical control over any part of the general system of national education, in keeping the State school system open for the free passage of ideas, in offering variety of spiritual as well as intellectual opportunity to all who come, and in maintaining side by side with the State system, but in friendly relations with it, a comparatively few but perfectly equipped schools, accessible to those who wish to attend them and imbued throughout with the spirit and associations of a definite religious faith. There seems no reason to fear that in England a State system of education, closely related to local conditions and free from any vestiges of ecclesiastical control, would cultivate a spirit hostile to religious influences or be unfavourable to religious liberty.

But it is not only in regard to the dissemination of religious beliefs that the power of intellectual control possessed by the day school has been overstated by many writers. There is a tendency

in educational writings (Comenius began it and his modern admirers have carried it much further) first, to count up the numerous influences which may train the mind and beneficially affect character, and then to try to squeeze them all into the theory of the day-school curriculum. The result would be, first, congestion of the time-table; next, a demand for the extension of school activities beyond the capacity of any but quite exceptional teachers, not to speak of the limits of reasonable expenditure; then would come failure and disappointment through attempting too much; and, finally, the too ambitious theory of the functions of the school would break down by its own weight. It seems to me that we shall get much more out of the ordinary schools by expecting less of them than current educational theories prescribe. Greater intensity of work within narrower limits, but with more training in the power to think and to find out things, and with less absorption of masses of knowledge, is likely to give better results than are an overloaded curriculum and multiplicity of subjects. The mistake lies in assuming that the day school can do everything. In point of fact it has but little time at its command; and it is only concerned with part of a child's daily doings. To put forward exaggerated claims on its behalf is to provoke reaction. The day school can accomplish a great work if it is allowed to concentrate upon what it can do well. But it is only concerned with part of the educational process, and it is an error to

throw upon it heavier work than it can effectively do. The other parts of the child's environment—the home in particular—need to be brought into closer connection with the spirit and work of the school.

Is, then, a really national system of education likely to arise in England out of the present stir of thought on the subject, or shall we sink back into a period of disappointment and indifference? I will now state some of the considerations which must be weighed by those who may attempt an answer to this question.

In the first place, there is a strong and growing conviction, especially in the great towns, that, through ineffective use of the power of education, an unduly large part of our intellectual resources is allowed to run to waste. We seem to make too little out of our average material. Germany gets more out of boys of middling ability than we do. The economic struggle with other nations is forcing upon us the neccessity for vigorous action in regard to education. But it would be unfair to regard this movement in thought as solely due to concern for industrial and commercial prosperity. It rises also from a conviction that for social welfare, for the complex tasks of municipal government and for the organisation of agricultural industry, we need more of the trained intellectual power which is the outcome of a highly efficient system of elementary and secondary schools.

Secondly, there is a remarkable stir of educational thought among teachers in all parts of the

country. The position is quite different from what it was five years ago. You find in every district some teachers who are doing work of striking originality and signal value. The interest is shifting from questions of organisation to questions of methods of teaching. It is unquestionable that in freshness of treatment combined with thoroughness there is being done in some English schools at the present time much educational work which is unsurpassed, and probably unrivalled, in the world.

Thirdly, among artisans there is a keen desire for improvements in the education available for their children. They feel that their children have not so good a chance here as they would have in America, and they see no reason why matters in this country should not be quickly improved. They are of opinion that the classes in the elementary schools are too large; that the staffs of teachers are not adequate in number; that the children make very little progress between twelve and fourteen; and that there is need for good higher grade schools giving a thorough training up to fifteen years of age.

Fourthly, there is a disposition in all parts of the country to think of national education as a whole, from the elementary school to the University, and to consider, as never before, the connection between the different parts of the system. The giving of responsibility for elementary and higher education to one and the same local authority has strengthened this point of view. The idea of the

unity of national education is working like leaven. At present we are far from real unity—partly because of breaks of gauge in the curriculum, partly because of the influence of old traditions, partly because of social distinctions—but we are certainly nearer to unity than ever before in the history of English education, and every year there are more bridges built across the gaps between one grade of school and another. I am inclined to think that, taking the matter as a whole, social divisions in educational matters are weakening a little. As the publicly managed day schools improve in quality, they attract support from many who, even a few years back, would have sent their children elsewhere.

These movements of opinion tend towards the establishment of a national system of education on broad, popular lines, but discouraging features in the outlook must not be forgotten. The chief of these are as follows.

First, there is a very strong feeling of discontent at the increased rates which it has been necessary to levy for education. The increase has been almost entirely due to the need for improvement in many of the elementary schools for which the county and county borough authorities are now responsible. In many districts, the ratepayers are opposed to providing funds for secondary and higher education, though such funds are urgently needed in the interests of educational efficiency. It is held that a much larger proportion of the cost of education should be met by grants from the

Treasury. This current of opinion may lead to an increase in the power of the central authority and to some weakening of the power of the local authorities. For a time, this change might seem to hasten the growth of a national system of education, but it is doubtful whether, in the long run, education (elementary and higher elementary education at all events) would not suffer by the lessening of a sense of local responsibility for the welfare of the schools.

Secondly, there is still a good deal of indifference in many districts with regard to the improvement of the local secondary schools. It is true that local responsibility for the welfare of these schools is new and that there has hardly been time for the importance of the responsibility to be fully realised. On the other hand, the fact that the leading residents in each district usually send their own sons away to boarding schools at a distance withdraws from the local secondary day schools the personal interest which they would otherwise enjoy. For the time (though there are some signs of a reaction) the habit of sending boys away, even from an early age, to boarding schools is increasing rather than otherwise. Yet experience in other countries shows that strongly staffed and well-taught secondary day schools form the intellectual backbone of a system of national education. Our local secondary day schools suffer as a rule from crippling poverty. The assistant masters are usually paid miserable salaries, and not one in a hundred of them can

hope (unless he becomes a headmaster) ever to earn £300 a year. The vast majority receive between £150 and £200. They have no pensions on retirement, no allowances in case of prolonged illness. Those who realise the difficulty of their work, and the devotion with which so large a number discharge their duties, cannot but feel indignation at the unworthy return which is made for their services, and a strong hope that something may be quickly done to place the scale of salaries upon an entirely new basis. As a result of the quite inadequate remuneration now given to assistant masters in the local secondary schools, the supply of competent recruits for the profession is running seriously short. Unless steps are taken in the early future to make the calling of secondary schoolmasters more attractive to properly qualified men, we shall have few local secondary schools of anything like the intellectual efficiency which is the secret of the power of the German higher schools and of the competence of German industry and commerce. To put our English local secondary education into a state of real efficiency will cost about a million a year. No other million of public funds would be more profitably spent. Directing brain-power is as necessary to the national safety and welfare as is a strong navy. And to secure directing brain-power it is indispensable to have well taught and intellectually vigorous secondary schools.

Thirdly, we have been prone in England to overlook the importance of a good general

education as a basis for technical training, and, in consequence, have sterilised much of our educational effort by premature specialisation. We are sometimes severely criticised for looking at the subject from an entirely wrong point of view. "The real cause of failure in our efforts for education hitherto," said Mr. Ruskin, "whether from above or below, has been that there is no honest desire for the thing itself. You must forget your money and every other material interest and educate for education's sake only, or the very good you try to bestow will become venomous, and that and your money will be lost together." No one will deny that we are apt to think at times too exclusively of "what will pay" in a narrow sense, but I do not see that we can fairly be blamed for asking practical questions about the aim and purpose of education. Those questions go to the root of the matter. The business of education is to prepare for life, and to ignore the requirements of life in planning a course of training would be silly. "To educate for education's sake" is too vague a prescription. Our mistake has been that we have acted on a wrong theory of education through not scientifically testing our assumptions. Experience shows that a good *general* education, which touches the imagination, opens the mind, trains the power of tracing the connection between cause and effect, and cultivates the power of expression, is the only sound basis for technical education, for higher studies and for civic efficiency. We have

not given enough of it, but have stinted it and grudged it to those whose school days must be short. There are signs of a change of public opinion on the subject, but the old tradition of narrowness and of premature specialisation—whether for scholarships or for practical industry—will die hard.

Fourthly, over and above a well-equipped school system, there is need, if scientific knowledge is to permeate national life, for the more systematic encouragement of research. This encouragement has been much less systematically given in England than in Germany or France. It is not enough to set a man to find out something which can be turned to immediate profit. Disinterested and systematic research for the extension of knowledge is the indispensable thing. Profitable applications will result, no doubt, but the history of science shows that they mostly come as bye-products from some long process of investigation which was carried through from the love of knowledge and without the direct intention of finding new sources of profit. "Keep your eye upon the originator of knowledge," said Tyndall; "give him the freedom necessary for his researches, not overloading him with the duties of tuition or administration, not demanding from him so-called practical results: above all, avoiding that question which ignorance so often addresses to genius—'What is the use of your work?' Let him make truth his object, however unpractical for the time being that truth may appear. If you cast your

bread upon the waters, it will return to you, though it may be after many days."

IV

No one can candidly investigate the working of the educational system in Germany, or study the prospects of education in America, without coming to the conclusion that it is a vital matter for us in England to put our educational house in better order without further delay. But, for my own part, I hope that we shall attempt to copy neither the German system nor the American, but work out a plan on our own lines.

Any stiff system of bureaucratic control would probably be impracticable here, and would certainly be injurious to educational development. But it would help to a clearer understanding of the problem if we had a simple classification of schools, in place of the present bewildering confusion. No one can now say at what age "secondary education" begins. No one, looking at an alphabetical list of secondary schools, can judge the standing, or the scope of work, of the great majority of them. For all practical purposes, much of the country is still educationally unmapped. Do we not need a careful survey of the whole of our educational resources, in the light of the economic needs and social conditions of each district? In no other way can we judge the possibility of making the work of one grade of school dovetail into the work of another grade,

or form a clear notion of the real catchment-area of each school, or ascertain whether existing schools might not, with a little further aid, be made to serve a better purpose and a wider neighbourhood. Denmark has husbanded its educational resources to great advantage.[1] Public and private effort have been thriftily woven together, and the whole system inspired with a national purpose.

As a simple form of classification, I would suggest that all education up to twelve years of age, in whatever type of school it may be given, should be classified as elementary or preparatory. The grants for pupils under twelve years of age in public elementary schools would remain as at present. Private schools educating children under twelve, and found on inspection to be supplying efficient teaching in suitable premises, might be officially recognised as preparatory, but would receive no grants from public funds. The junior classes of higher schools would similarly be classified as preparatory, but the schools would receive no grants under the head of secondary education for that part of their work. The education beyond twelve might be known respectively as higher elementary, or secondary, or higher secondary, according as the course of studies was planned to extend to fourteen or fifteen; or to sixteen or seventeen; or to eighteen or nineteen, respectively.

[1] The writings of Mr. J. S. Thornton on Danish and Norwegian education are full of suggestion to English administrators. See "Special Reports on Educational Subjects," vol. i.

For each type of education beyond twelve years of age there is need for increased Government aid in proportion to the real cost of efficiency in each case. The largest grant should be for the "higher secondary," in view of the greater costliness of the course which would have to be provided for the comparatively small number of more advanced students.

In the sphere of public elementary education, it is of urgent importance that the size of the large classes should be reduced. A teacher who has fifty or sixty pupils to teach at one time cannot meet their individual needs. The excellent "Suggestions for the Consideration of Teachers and others concerned in the work of Public Elementary Schools," recently issued by the Board of Education,[1] cannot for the most part be put into practice unless the classes are made smaller. The "Suggestions" also presuppose a high level of culture and of educational skill on the part of the whole body of teachers. The changes which have been made during the last two years in the regulations for the training of pupil teachers will secure for a very large number of the future teachers the advantage of a longer course of general education than has been hitherto possible. In due time this change will bear good fruit in the work of the schools. But the large classes will have to be done away with if the country is to get what it needs from its system of public elementary education. "The value of any act of the teaching

[1] Wyman & Sons, 1905, Cd. 2638. 8d.

process," says the Board of Education, "lies in the way in which it calls into play the natural activities of the children, and develops in them a sense of their powers, and of the added mastery of these which each succeeding use secures. The teacher, therefore, must know the children and must sympathise with them, for it is of the essence of teaching that the mind of the teacher should touch the mind of the pupil. He will seek at each stage to adjust his mind to theirs, to draw upon their experience as a supplement to his own, and so take them, as it were, into partnership for the acquisition of knowledge. Throughout the lessons, it is essential that the children should be trained and encouraged to talk *individually*. Collective answering or collective repetition by the class of the words of the teacher is an actual hindrance to development of genuine thought and free expression. . . . The children should from the first be encouraged to find subjects of interest on which they can talk, and to ask questions."[1] This is admirable, but it means small classes. Fully realising what expense would be entailed by so great a change in our present system, I venture, nevertheless, to urge that the change will have to be made if our elementary schools are to produce the right intellectual results. Only in smaller classes under cultivated and skilful teachers can the children be taught how to think, which is the supreme intellectual aim of education. With a reduction in the size of classes would go

[1] "Suggestions for the Consideration of Teachers," pp. 14, 30.

the better classification of the children according to aptitude and the rate at which they can learn.

Again, we have done far too little to secure medical inspection of the children in elementary schools. Should there not be in every school exact and systematic inquiry into the physical condition and needs of those receiving instruction? Acting on the results of such inquiries, we should proceed to remove the parental ignorance and the hurtful social conditions which at present hamper the growth and well-being of so many children. There is need for more scientific husbandry of the human material of which the nation is composed.

Among the further needs of our elementary education are—(1) the better teaching of the mother tongue and the fuller training of the power of expression (in this matter France and Germany put us to shame); (2) better grading of the work done in the highest classes and strengthening of the teaching staff accordingly (it is a frequent complaint that pupils practically mark time between twelve and fourteen); (3) the establishment of central schools, with carefully chosen teachers and complete equipment, at convenient places in country districts, the pupils being conveyed to these schools from the surrounding villages and scattered houses, as is being done with striking success in parts of Canada and of the United States; (4) the formation of higher departments in connection with selected elementary schools, on the lines encouraged in parts of Scotland by

the Dick Bequest;[1] (5) the establishment, in some districts of large towns, of a new type of elementary school, with much more manual work in the curriculum, for boys who, in the opinion of the teachers, would gain by having a course of training more industrial in character than is appropriate for the ordinary schools; (6) the provision of a large number of domestic science schools, giving girls from the elementary schools a five months' course of practical instruction in the duties of home life, on the model successfully adopted in Liverpool;[2] and (7) active encouragement in rural schools of the teaching of natural history, where possible in connection with school gardens, an adaptation of the course of study to the children's surroundings which is approved by the Board of Education and is being promoted by the Essex and other County Councils. This teaching, indeed, is as valuable in the town as in the country schools, but its omission from the latter is inexcusable. The teacher, as is well said in the "Suggestions" referred to above, "must continually ask himself whether his teaching proceeds from the

[1] The work of such higher departments and of separate higher elementary schools would quickly remedy the defect to which Sir William Mather referred at the inaugural meeting of the British Science Guild on October 30, 1905: "We have not a sufficient number of the foreman class, the subordinate manager class, to carry out the methods of science which emanate from the top, and sufficiently well educated to second the efforts of those who are at the head of great concerns."

[2] For a description of the domestic science school founded in Liverpool by Miss Calder see "Report on Secondary Education in Liverpool," pp. 114 ff. Eyre & Spottiswoode, 1904.

thing, whether it is designed to encourage observation and thinking in his children, to make their minds active and not merely receptive, whether it is experimental enough, whether it is first hand."

It would be an incalculable benefit to English national life if the whole of our elementary school system were full of the intellectual vigour which already distinguishes some of the schools, and if, through improved staffing and access to playing-fields, the success of the best schools in encouraging corporate spirit could be reproduced in all. The old idea that the public elementary schools are for the poor only has lost much of its power but still works mischief to the unity of our social life. The quickest way to eradicate it is to make the public elementary schools so good that parents who have their children's welfare at heart will want to send them there.

Urgent, too, is the need (in some respects it is the most urgent) for an improvement in the great majority of our local secondary day schools. They have been left to a bitter struggle with financial difficulties. They can, as a rule, afford no more than a pittance to their assistant teachers. Very many of them are ill equipped for the teaching of the humanities. Mr. Headlam, in his "Report on the Teaching of Literary Subjects in some Secondary Schools for Boys,"[1] dwelt upon the need for better school libraries. "In scarcely a single school" (he was referring to seventy which

[1] "General Reports on Higher Education," 1902, p. 65. Eyre & Spottiswoode, 1903. Cd. 1738. 6d.

he had visited) "has an attempt been made to form a collection of books which the masters and boys can use in the illustration of school work. There will be a finely-built and well-equipped laboratory, an unlimited supply of expensive material for the teaching of chemistry and physics, but there will not be found a good atlas of modern times, much less an historical atlas. There will be no standard dictionary of the English or any other language. The master who is giving a lesson on English history will find no book to which he can refer for information where the text-book is defective, or for those illustrations and details without which no narrative is more than words. There are in the English language books of the greatest interest and merit dealing with those scientific studies in which so much time is passed; there are books on natural history and travels which would be of interest to many boys. Their existence is in many places entirely unknown to them. How can it be expected that they should acquire a love of reading or study? The result is that it is no uncommon thing for a bright and intelligent boy to leave school at the age of sixteen or seventeen without ever having had an opportunity of becoming personally acquainted with any book except the text-books written purely for school purposes. . . . The boys have an excellent introduction to the study of the natural sciences, but they are not introduced to the world of books and literature. They are not taught to read for pleasure; they are not taught to use

books so as to extract information from them. The training of the imagination and sympathies, which is the chief use of history, is absent. The boy has no acquaintance with the English language as used by those who know how to use it, and it is not surprising that, when he attempts to express himself on paper or orally, he has little skill or facility. Were it not that from time to time one sees what excellent work can be done when there is a teacher with knowledge and interest who believes in the importance of what he is teaching, it would be difficult, after visiting many schools, not to lose all faith in the possibility of making literary teaching useful and efficient."

There are bright exceptions, of course, but the condition of many of the local secondary schools in England is nothing less than a grave national weakness. "It must be remembered," continues Mr. Headlam, "that those who are educated in these schools are those in whose hands will rest the greater part of the local government of the country. From them come the greater number of the teachers and writers for the press. They are allowed to leave school without any adequate training in some of the most important parts of mental activity. While fully recognising that the natural sciences and mathematics must in very many schools have the predominant place, I submit that the neglect of and indifference to other sides of education must have a most harmful influence on the intellect and character of the nation."

Since these words were written, the new Regulations for Secondary Schools have enjoined a better balance of studies, but practically nothing has been done by the State to secure improvement in the staffing of the schools. Some of the county and county borough councils have done much—notably those of London, Liverpool, Lancashire and Cheshire—but the state of things is still so grave that, unless action be quickly taken on a considerable scale, we shall find ourselves with the worst system of middle secondary education of any civilised country. So far, the intellectual defects of the teaching have been balanced by the character-forming influences of our English secondary school life. But this, too, will be threatened, unless there be drawn into the service of the schools an adequate supply of new masters with the experience and education which the work requires. The essential thing in the school is not the time-table, or the buildings, or the equipment, though all are valuable, but the character, the influence, the intellectual power and the skill of the teacher. It is not enough to put the right subjects into the time-table; there must be the right man to teach them, and to teach not with accuracy only, but with life, and with the power to make the subject a way of approach to great questions. To do this a man must believe in the value of what he teaches. He must be fresh in his knowledge of it, himself a learner too. It must be part of his own life, and have a message for him and through him for those

who can learn from him. *Pour faire quelque chose de grand, il faut être passionné.* What is wanted in the schools is more intellectual zeal.

A great increase in Government grants for secondary schools is urgently needed. It should be large enough to make the payment of adequate salaries possible. The payment of such salaries to a staff of competent teachers should then be made a condition for the continuance of the grant. And the salaries should be progressive, so that an assistant master or mistress could look forward, after years of faithful and strenuous service, to a fair competence in middle life. Such a change in conditions would attract the right men into the work of secondary school teaching. And their work would train up competent successors. The probable reason why there is so little of the teaching instinct among men in England as compared with Germany is that so few Englishmen have themselves ever known what good teaching is and what it can do.

In the higher secondary schools of England there is, alongside of merits which, it may be said without exaggeration, are admired by the whole world, one grave defect which could easily be remedied and for the remedying of which the masters themselves are anxious. The earlier years of higher secondary education are, as a rule, passed by English boys in a preparatory school. The curriculum of these schools is controlled by the entrance and scholarship examinations at the public schools. The latter lay almost exclusive

stress in these examinations upon Latin, Greek and mathematics. The result is that, in the preparatory schools, English subjects (the mother tongue, English literature, history and geography) and the beginnings of natural science receive very secondary consideration. But these are among the most essential of studies for boys of from ten to thirteen years of age. Thus we suffer in our higher secondary education from a kind of over-specialisation which is, in point of subjects, almost the converse of that of which Mr. Headlam complained with regard to many of the middle secondary schools. The extent of the mischief is shown in Mr. Gidley Robinson's article on the Preparatory School Curriculum in vol. vi. of "Special Reports on Educational Subjects."[1] "As it stands, the curriculum deals unwisely by the clever boys and unfairly by the rest. As long as preparatory school training is directed mainly to the effort to teach so many languages at once —one of them at least of supreme difficulty—so long shall we fail to give young boys anything but a one-sided and inadequate training." He urges the need for "a more reasonable curriculum —something richer and less bookish than we now possess, and therefore better suited to the needs of young children: full of stimulus as well as of discipline, and therefore fitted to encourage them with a growing sense of mental power: more

[1] Eyre & Spottiswoode, 1902. Cd. 418. 2s. 4d. Pages 61–78. The whole volume is devoted to the description of the work of the preparatory schools.

liberal in scope, and therefore making provision for varieties of aptitude. No country can afford to concentrate its whole efforts upon the clever boys: our aim must be to develop every single unit, as far as is possible to him, into an intelligent and efficient member of the body politic. No one who is acquainted with the average English schoolboy can doubt that intellectually he is not a success. It is high time that our methods were revised." The failure in kindling intellectual interests, of which complaint has recently been made by Mr. Arthur Benson and others, speaking with long experience of the Public Schools, may be traced back to its root here. There are other causes, but the cramped, over-specialised, and unsuitable curriculum of the preparatory schools is the chief one; and the fault lies with the entrance and scholarship examinations at the Public Schools. In November 1905 the Committee of the Association of Preparatory Schools met to consider certain questions submitted to them by the Headmasters of Eton and Winchester. The first question was, "How far would the postponement of Greek in Public School entrance examinations (not scholarship examinations) afford relief to preparatory schools?" The answer was that "the relief afforded would be about six and a half hours per week (in the upper forms) if Greek were dropped." The second question was, "How does the high standard of classics demanded for scholarship examinations affect the curriculum of non-scholars?" The answer was: (*a*) The higher

standard demanded determines the curriculum of all boys. (*b*) This standard renders a wide curriculum impossible.[1]

Further, it is much to be desired in the interests of science that there should be organised as speedily as possible a permanent Anthropometric Survey on the lines recommended by the Inter-Departmental Committee on Physical Deterioration in 1904.[2] Such a survey would furnish the nation with knowledge as to the health and physique of the population—a subject upon which we possess at present only disjointed and inadequate information. The Committee recommend that the survey should be based, in the first instance, upon the periodic taking of measurements of children and young persons in schools and factories. It would be controlled from a central bureau in London, but the actual observations would be made by the assistance, among others, of teachers and factory surgeons, "supplemented by a small staff of professional surveyors or measurers."

Again, in the present state of educational science, it is much to be desired that the central or local authorities should encourage, in selected schools, experiments in methods of teaching and in curriculum. Such action is strongly recommended by the Board of Education to local educational authorities in the "Suggestions for the

[1] *The Preparatory Schools Review*, December 1905.

[2] "Report," pp. 8–13. Eyre & Spottiswoode, 1904. Cd. 2175. 1s. 2d.

Consideration of Teachers and others" (p. 6). In connection with the University of Manchester there are now two schools of experiment, and valuable results would follow from the selection of schools in other parts of the country for experimental work in various directions. We need illustrative experiment in methods of teaching English composition and other subjects in the curriculum. Also careful tests should be made, as already has been done in Germany, of the results of postponing the beginning of Latin till twelve years of age. Inquiries, conducted with quantitative precision, into the questions of school fatigue and the rate of progress made in the chief elementary subjects are also needed. The experiments should be carried on systematically for a period of years, and the results gained (records of failures as much as records of success) circulated among the whole body of teachers. It deserves consideration whether there should not be a special Government grant to encourage this experimental work.

To sum up. For the welfare of English education, are not these things the most necessary—to secure, at all costs, good teachers, and plenty of them, both in secondary and elementary schools; to give free scope to individual conviction; to pay much more attention to physical training and to the physical well-being of the children, especially in the elementary schools; to cultivate the power of expression in the mother tongue and the love of good literature; to spare no effort in training the power of imagination,

combined with the habit of exact thinking; to make the study of nature part of the work of every school; to encourage and record experiments in methods of teaching; not to sacrifice spontaneity of mind to the claims of examinations; and to foster in schools of all grades, public and private, the national spirit?

SCIENCE AND COLONIAL DEVELOPMENT

H. DE R. WALKER, M.P.

IN his "Law and Public Opinion in England," Professor Dicey traces the gradual displacement of the old belief in individualism by faith in the benefit to be derived from State intervention; and he enumerates some of the measures which bear the impress of collectivism. The extension of this survey from Great Britain to Greater Britain, together with the consideration of similar action taken by societies or individuals, would seem most likely to fulfil the purpose of this chapter. For the whole scheme of the book is a negation of the idea that the individual is able to make the best use of his life by his own unaided efforts. Liberty, the right to unfettered development, is insufficient. The application of scientific discoveries and scientific methods to the needs of the individual must be fostered and encouraged by the State. And if this is true of the Englishman, how much more must it be true of the backward races for whose welfare the United Kingdom has made itself responsible!

The subject before the writer is so complex that he will omit all reference to India, to Egypt, or to the Anglo-Egyptian Soudan, which are not under

the direction of the Colonial Office; while Mr. Mackinder[1] is dealing with communications which must otherwise have been included in a discussion of the trend of colonial development. To some extent, no doubt, it will not be possible to keep the two lines of inquiry quite distinct. For instance, the great frozen-meat trade of New Zealand could not have grown up in the absence of facilities for cold storage upon the steamers, but it would not have become what it is if the New Zealanders had not erected the most modern plant for the delivery of the meat in exactly the right condition to the shippers. Again, perishable fruit is now transported many hundreds of miles in chambers upon the steamers which are kept at a uniform temperature throughout the journey. But a remunerative trade depends upon the regularity of the supply of fruit at the point of departure, and to an even greater extent upon the degree of ripeness at which it is picked. Jamaica has been fairly successful in solving this problem, but the attempt to establish a similar industry in some of the smaller West Indian islands is still in the experimental stage. Moreover, uniformity of supply is as important as regularity, and it is by the standardisation of its butter, under governmental supervision, that the State of Victoria has been able, in co-operation with the steamship companies, to build up a large export trade in that commodity.

It will now be convenient to consider more

[1] Mr. Mackinder, owing to pressure of work, has been unable to contribute to this volume.—ED.

closely what is meant by the words, "colonial development." It is the object of this chapter to consider how far scientific methods have been applied to the development of British colonies, and a fundamental distinction at once arises. Some of these colonies being financially, as well as politically, in a position of practical independence, their rate of progress depends upon themselves, and not upon the Mother Country. In the case of the crown colonies, on the other hand, as very little opportunity is given for local initiative, the responsibility of the Mother Country is direct and unquestionable. There are also a few colonies, of which Barbados may be taken as a type, that occupy an intermediate position. They possess an elective legislative authority which has the control of the purse, but the executive officers are not subordinate to the legislature as in the self-governing colonies. (The new constitution of the Transvaal, which is admittedly transitional, partakes of this character.) Here, there is a theoretical division of responsibility, but, without entering upon a discussion for which there is no space, it may be said that, practically speaking, the responsibility rests with the Mother Country.

We have, then, two main types of colonies, and it will be our purpose to consider whether the self-governing colonies[1] are alive to the value

[1] The writer strongly objects to the use of the term "self-governing colonies" as applied to such countries as Australia, Canada, and New Zealand, but he is unable to find any other applicable term when reference has to be made to them, not individually, but as a group of self-governing communities.

of scientific methods, and whether the Mother Country is alive to it in the development of the colonies for which the responsibility has not been transferred. But there is also an interesting group of activities which does not come under one or other of these categories. It may be characterised as general action for the common welfare of the whole, and, while it will be found that there is much to commend, it is also true that much remains to be done.

This is obviously the case in regard to Imperial Organisation and Imperial Defence, problems which must be left to others who have more space at their command, but which as urgently demand a scientific solution as any of the humdrum affairs of everyday life. The claim is also made for Mr. Chamberlain's proposals that they aim at adjusting the internal fiscal relations of the Empire on a scientific basis. But, here again, the limitations of space are prohibitive, particularly to one who denies the soundness of this policy. There are, however, other aspects of commercial intercourse to which this objection does not apply.

The machinery by which the various parts of the Empire are made acquainted with each other's commercial requirements, was, until recently, most inadequate, and is not yet properly organised. There were, indeed, periodical exhibitions of products. Colonial exhibitions have been held in London and a few provincial cities. English manufacturers have exhibited their goods in the colonies. A Congress of Chambers of Commerce of the

Empire has been held in Canada; and Canadian manufacturers have returned the visit. The greater colonies have been well served by their High Commissioners and Agents-General and by other commercial agents. On the whole, perhaps, by these means, and through a generous outlay in the way of advertisement, the colonial producer, particularly in Canada, has of late years not had much cause for complaint, though it is only now that attention is being paid to the possibilities of inter-colonial trade. Canada is seeking new markets in the West Indies and in South Africa; while Australia and New Zealand also see in South Africa a possible outlet, more especially for their frozen meat and butter. Between Canada and Australasia the trade hitherto has been of the smallest dimensions.

But what of the reverse process? What steps does the Mother Country take to become acquainted with the requirements of the colonies, and to meet these requirements? The Commercial Intelligence Department of the Board of Trade now has the matter in hand; but until it was appointed, British manufacturers had no regular source of official information. Their attention was called to foreign countries, and to the colonies of foreign countries by the Consular Reports, and to British crown colonies by the Reports on the Blue Books. And the value of those documents has been increased by the periodical publication of an epitome of their contents. But it seems to have been assumed that British manufacturers were

bound to monopolise the import trade of the self-governing colonies, and that no organised effort was needed to maintain it. However that may be, *there have been no annual reports from these colonies, nor are there such even at the present time.* Presumably also there was no one available for this work, as it would scarcely be suggested that the ordinary staff of a governor in a self-governing colony would be capable of much beyond ornamental and social functions.

When Mr. Chamberlain went to the Colonial Office, with the avowed object of fostering Imperial trade, he was struck with the weakest link in the chain, and he caused a circular letter to be issued to the colonies, in which he sought to ascertain the best means for attaining the following objects :—

(*a*) The regular transmission to this country of such commercial information as will, if possible, anticipate inquiries.

(*b*) The establishment of a recognised system under which such inquiries as cannot be answered in the Intelligence Branch may be referred to the colony to which they relate.

In 1900 an Advisory Committee on Commercial Intelligence was appointed in connection with the Commercial Intelligence Branch. It consists of representatives of the Board of Trade, the Foreign, Colonial and India Offices, and a sprinkling of manufacturers and Members of Parliament, to whom colonial representatives are now being added. From its first Report,[1] which has just

[1] Cd. 2044.

been published, it can be seen what has been done to carry out Mr. Chamberlain's ideas. Most of the crown colonies, Victoria, and New Zealand, have appointed local agents, who will be prepared to reply to inquiries; and the Committee has appointed correspondents, though not so as to supersede colonial agents, in five cities in South Africa. It also had a special inquiry carried out for it in South Africa, and a similar one in Australia is now in progress. But it has been handicapped by the limitations of the Annual Grant, of which it could dispose, to £1000. Out of this amount it managed, its activity not being confined to the British Empire, also to send commercial missions to Persia and Siberia. This record of achievement would, however, have been smaller if Mr. Birch-enough, who had already been entrusted with a mission to South Africa, had not been willing to give his services gratuitously to the Committee. And it does seem rather ridiculous to starve a body of this character, even though it be prudent to try a new experiment tentatively, when hundreds of thousands of pounds are being spent year by year upon grants-in-aid to tropical colonies without, so far as can be seen, any genuine attempt to reduce the outlay.

This Committee works in close co-operation with the authorities of the Imperial Institute, which has entered upon a new lease of life since it was taken over by the Board of Trade in 1903. The *Imperial Institute Journal* has been merged in the *Board of Trade Journal*, which is published weekly,

and lays marked stress upon openings for British trade. On the other hand, the quarterly bulletin of the Imperial Institute continues to give particulars of its work, and reports investigations carried out as to the economic value of various products by Professor Wyndham Dunstan and his staff. For instance, it was discovered that oil could be extracted from a West African nut which had previously been regarded as valueless, if it were put through a certain kind of mechanical process.

The transference of the congested population of the United Kingdom to the British Dominions beyond the seas is another matter of general importance. So far as the colonies are concerned, Canada, as is well known, is making every effort, and with increasing success, to divert to itself the stream of emigration which might otherwise reach foreign shores. The conditions in South Africa are not at the moment favourable to any considerable increase in the white population. Australia and New Zealand are handicapped by the distance from the British Isles, which involves the higher cost of emigrants' passages. Beyond this, New Zealand seems to be satisfied with the normal excess of births over deaths, supplemented by the few thousand picked persons who are attracted every year by the exceptional soil and climate. Australia is now awaking to the danger attending a population of less than four millions spread irregularly over an area of three million square miles. Its policy in regard to immigration has given rise to much misunderstanding, the existence of which,

though largely unjustified, proves it to have been carried out injudiciously. There has been no desire to exclude white persons unless they arrived under contract to work at a rate of wages below the current standard, or to take the place of strikers in an industrial dispute. The feeling, however, as to coloured immigrants does amount to a desire for their exclusion, which, it is hoped, under legislation now before the Parliament of the Commonwealth, will be arranged for in such a manner as not to give offence in any quarter.

But, if such persons are to be kept out, others must take their place. The governments of Western Australia and Queensland have for some years been advertising the resources of their respective States; but it is now felt that commensurate results can only be obtained by corporate effort. There is, however, the difficulty that the ownership of the crown lands, carrying with it entire control over the policy and methods of alienation, is vested in the individual States. It would, therefore, seem to be advisable that the several Land Acts should be brought to some degree of uniformity, and that the authorities of the Commonwealth and of the States should then agree upon a joint scheme of action. They should be encouraged by the example of Canada. Every one knows about the North-West which the Dominion Government, as owning the crown lands, keeps constantly before the public attention. On the other hand, although some of the older Provinces, which control their crown lands,

are also making rapid strides (mention may be made of the part of Ontario which is known as New Ontario), they retard their advance by the scanty circulation of the openings that they offer to settlers, and for the investment of capital.

On this side there is no official promotion of emigration. The Emigrants' Information Office publishes handbooks and pamphlets on various colonies, but, true to its title, confines itself to the distribution of information. It undoubtedly does excellent work in preventing people from going to places where they would be unlikely to find employment. Communications are made by direct correspondence and through the columns of the *Labour Gazette*, one of the organs of the Board of Trade. An active policy may be inaugurated upon the recommendation of Lord Tennyson's Committee which is now sitting at the Colonial Office. In the meanwhile, various private agencies are engaged in providing facilities for emigration. The work of one of them, the British Women's Emigration Association, with which the writer is personally acquainted, is worthy of a brief description, as being a model of intelligent organisation. The emigrants are most carefully selected, and loans are made to them where it is necessary to supplement their slender resources. They cross the ocean under the protection of matrons, who are engaged and paid by the Association; and upon their arrival at their destination, they are received by trustworthy correspondents who find situations for

them, keep in touch with them, and encourage them to repay their loans as they become in a position to do so. Some five hundred women are thus enabled every year to improve their lot, and the promptness with which they repay the loans is a proof of the admirable character of all the arrangements.

In the matter of migration the trend is all in one direction, and it has been left to Mr. Rhodes to initiate a scheme which brings the youth of the colonies to the Mother Country. British Universities have always attracted a certain number of colonial students, but until Mr. Rhodes provided the ways and means, some £60,000 a year, there was no system of organised selection. At the present time more than a hundred colonial scholars, chosen on grounds of combined physical, intellectual, and moral energy, are being educated at Oxford, and while they will benefit from the added power given by three years of earnest work, and will not enter professional life with the feverish haste which in new countries tends to superficiality,[1] they should give as much as they receive, and widen the horizon of those with whom they associate. On many matters, as every one knows who has studied the colonies on the spot, Englishmen and colonials do not think alike, and it is to be hoped that the Rhodes scholars will form friendships that will persist through life, and offer a medium for the regular

[1] *Cf.* "The Rhodes' Scholarships," by Dr. G. R. Parkin, *Journal of the Royal Colonial Institute*, vol. xxxvi. p. 3.

interchange of ideas. Misunderstandings may thus be avoided which would be due solely to ignorance of a different standpoint. Somewhat in this connection, it may be mentioned that the Public Service Board of New South Wales advocates a limited reciprocity between the Australian Service and those of the rest of the Empire. In quoting this proposal, the Australian correspondent of the *Times* expresses exactly the idea that the present writer desires to convey: "One feels more certainly year by year that the parts of the Empire do not understand each other as they should, and that a more intimate mutual knowledge is absolutely necessary for the well-being of the whole. More especially, London does not understand Ottawa, or Cape Town, or Sydney, and they do not understand London." And he adds that "any scheme, particularly one originating in the colonies, for remedying this grave defect, deserves not polite shelving, but the careful and hopeful consideration of men anxious to develop all its possibilities and ensure its ultimate success."

To return to the influence of the Rhodes scholarships. There can be no doubt that it was under the inspiration of Mr. Rhodes' liberality that Mr. Beit has founded, also at Oxford, his Professorship of Colonial History. It will provide the first opportunity in the British Isles for systematic instruction in regard to the British Empire as a whole, and the growth of its component parts, and these lectures, as Mr. Beit may well have

thought, should prove of singular interest to the colonial students.

The impending arrival of the Rhodes scholars at Oxford may also have started the train of thought which led to the allied Colonial Universities' Conference that was held in 1903.[1] The main object of the Conference was to establish between the principal teaching Universities of the Empire such relations as would secure that special or local advantages of study should be made as accessible as possible to students from all parts of the King's dominions. In other words, it was desired to co-ordinate higher education throughout the Empire. And the representatives of the Universities of Greater Britain and the highest educational authorities of the United Kingdom made a preliminary step in that direction by the discussion of the reciprocal facilities that were already afforded. The ultimate aim, it was unanimously agreed, was the appointment of a representative Council that should keep in touch with the best work that was being done at all the Universities.

There are many societies, such as the British Empire League, with affiliated branches in Canada and Australia, the Victoria League, and the League of the Empire, that are working in various ways for the common welfare of the British race. Similarly in Canada there is a Society of the Daughters of the Empire. And, last but not least,

[1] A full report of the proceedings is published in the *Empire Review*, August 1903.

there is the Royal Colonial Institute, which has the finest colonial library in the Empire, and is the recognised place of meeting for colonials when they are in London. It publishes papers of exceptional interest by colonial administrators and others who are able to speak authoritatively upon Imperial questions. In the latest volume of the proceedings will be found addresses by Dr. G. R. Parkin, upon the Rhodes scholarships; Sir Charles Bruce, upon the Crown Colonies; Sir Frederick Pollock, upon Imperial Organisation; and Mr. Alleyne Ireland, upon the British Empire in the Far East.

Coming now to the second branch of the subject, the extent to which the self-governing colonies are alive to the value of scientific discoveries, the writer is confronted by a difficulty by which he must confess himself to have been beaten. The scheme of this book is critical. Shortcomings are to be exposed, and remedies for them are to be suggested. But criticism is unfair unless credit is also given for that which is praiseworthy. If that be so, the writer may not criticise because he has not space in which to describe fully what is being done at the present time. Take, for instance, the application of science to primary production. There is scarcely a colony in the group under consideration that has not established experimental farms at which instruction is given in the general theory and practice of agriculture, fruit-growing, and stock-raising. Or take, again, University education. In one or other of

the colonial Universities are to be found admirable schools of forestry, agriculture, engineering, and mineralogy. The most noteworthy case is M'Gill University at Montreal, which has benefited from the generosity of Sir William Macdonald to the amount of £700,000. In others, the State has contributed; but if, as is no doubt true, many of them are still insufficiently equipped, it must not be forgotten that young communities have to build up the entire fabric of government and administration. This consideration alone suffices to invalidate any comparison between a British Colony and an old-established country in Europe, and to enjoin a chariness in criticism. The writer has been asked whether he can quote an achievement similar to that of Sweden, where the amount of power obtainable from every stream is believed to have been determined. Certainly not; for Canada, while it has complete scope for its energies in the development of regions within easy reach of means of communication, would be foolish to go beyond the area of proximate settlement, except so far as the adventurous in every clime are always seeking out new fields. But the authorities are constantly engaged in improving the navigability of the St. Lawrence, while, fifty years ago, they constructed the Welland Canal, which enabled navigation to turn the flank of the Niagara Falls. Large vessels now proceed uninterruptedly through a series of canals from Lake Superior to the ocean, and surveys are completed for a canal to connect Georgian Bay

in Lake Huron with Lake Ontario, whereby the journey would be shortened by 400 miles. Moreover, the gigantic industry at Saulte Sainte Marie, worked entirely by water-power, has its counterpart, on a small scale, in the numberless saw-mills which remind the visitor of Sweden.

But, essential as is communication by water in Canada, railways play the all-important part in the development of the country to the westward of Lake Superior. The agricultural prosperity of Canada dates from the completion of the Canadian Pacific Railway. The Dominion Government paid, indeed, a heavy price for it in the way of a huge cash subsidy, a gigantic land grant, and a partial exemption from taxation; but there can be no doubt that progress would have been retarded for many years in its absence. There are now several competitors in the field. The Canadian Northern Railway, which has received subventions from the Government of Manitoba, operates a system which, starting at the international boundary, passes through Winnipeg and runs onwards in a north-westerly direction. It may eventually be carried to the Pacific, but it will no doubt be preceded in point of time by the Grand Trunk Pacific Railway, the second great trans-continental enterprise to be promoted by the Dominion Government. The eastern section, passing through northern Ontario and Quebec, and thence to Moncton in New Brunswick, is to be constructed by the Government and leased to the Company, which will in the meanwhile have made a new

connection between the Pacific and Winnipeg. This part of the undertaking should be remunerative, as it will render accessible land which is known to be very fertile; but the eastern section can scarcely be profitable in itself, and its avowed object is to divert traffic from the United States.

The crown lands in the North-West have been parcelled out upon a system that was borrowed from the United States. They are divided up into blocks of 36 square miles, which are again subdivided into 36 sections. Of these, 14 belong to the Canadian Pacific Railway, 2 to the Hudson's Bay Company, as a compensation for the loss of its territorial jurisdiction, 2 are set apart by the Government for purposes of education, while the remaining 14 are offered by them for settlement. The unit is the quarter section of 160 acres which is granted as a homestead upon the payment of £2.

This is the system under which the great wheat belt is developed; and the methods by which the Government have attracted occupiers to the land have already been described. But they did not consider that their responsibility was then at an end. Arrangements must be made whereby scientific knowledge should be placed at the disposal of those who did not possess it. How this has been done is described succinctly in the recent report[1] to the Board of Trade by Mr. Mavor, Professor of Political Economy at the University of Toronto.

"The result of the inquiry by the Committee

[1] Cd. 2628.

of 1884 was the establishment by the Dominion Government of a series of experimental farms; one was established at Ottawa, a second at Brandon for Manitoba, and a third at Indian Head for the North-West Territories.

"The system as now developed enables any farmer to make inquiry, without even the cost of postage, about any matter relating to his business, and enables him also to receive gratuitously small supplies of selected trees, &c. He can also for a small payment procure from the experimental farms, under certain conditions, pure bred stock. Connected with these methods of encouraging agriculture is the system by means of which, for a uniform payment for carriage of $5 (about £1) per head, a farmer in the North-West may have delivered to him at any part of Manitoba or the Territories pure bred stock from Ontario.

"For nearly twenty years extensive experiments in the selection and 'breeding' of varieties of cereals, in the crossing of fruit-trees, and in finding the best conditions for growth, have been carried on at all the experimental stations. Experiments are also undertaken under the auspices of the farm authorities at many places throughout Manitoba and the Territories.

"It is impossible to overrate the enthusiasm and ability with which this remarkable work has been carried on, at an extremely small cost, when considered in relation to the benefits which have accrued. It is not too much to say, that any one who is ignorant of the farming conditions or of

the methods recognised by scientific experience as appropriate is culpably ignorant."

Mr. Mavor points out that, as wheat is not indigenous to America, its behaviour in a relatively new habitat is still the subject of observation and experiment. The efforts of the experts at the experimental farms have, therefore, been directed towards the selection and improvement of the varieties of wheat with a special view to the conditions of the North-West. And the average yield of wheat is already appreciably higher in Western Canada than in the American States to the south of it. For further information, especially in regard to the diversity of crops, the method of handling, and the use made of irrigation in the semi-arid zone, the reader must be referred to Mr. Mavor's report, which is interesting throughout.

New Zealand is essentially the land of the small farmer, and it is becoming so every year to a greater extent. There are now upwards of 115,000 landowners in a population of 832,000, and every precaution is taken to insure that the crown lands shall only be alienated to persons who are prepared to put them to productive use. It is unnecessary to give a description of the Crown Land Laws, which, indeed, are absurdly complicated for so small a community. The important points are, that the area that any one person can take up is limited, and that strict conditions are laid down as to residence and as to the improvements that must be carried out within a stated period. Similarly with other colonies, New Zealand has to deplore

the wasteful disposal of large tracts of land in the past, and for the last twelve years the Government have been engaged in repurchase for the purpose of closer settlement. They have taken to themselves compulsory powers, but in the majority of cases they have been able to secure the properties that they desired by the ordinary process of negotiation. A sum of nearly £3,000,000 has been expended in this manner, and it is claimed in the latest report that the policy has been successful in promoting the welfare of the individual and of the colony. But it soon became apparent that the best class of settlers was not necessarily in possession of independent means. If they were already on the land, they were struggling under the burden of high rates of interest and the heavy legal expenses of mortgages; if they sought to go on the land, they would find it hard to pay their way until the returns began to come in. To meet these difficulties, the Government Advances to Settlers Act was passed in 1894, which provided for advances to settlers at a low rate of interest upon a fixed proportion of the improvements carried out on their properties which were of a marketable value. Under this Act 12,536 persons have received £4,000,000, and the value of the security for the advances is estimated at more than double that amount.

This necessarily superficial description[1] of the

[1] *Cf.* Reeves, "State Experiments in Australia and New Zealand," vol. i., chap. vi.; Walker, "Australasian Democracy," chap. iv.; "The Land Policy of New Zealand."

action of the Government of New Zealand should suffice to show that they have thought out, and put into effect, a reasoned policy in regard to the land. But they have gone further, perceiving the close connection between taxation and development. Of what use was it, they argued, to encourage a man to improve his land if at the same time he was deterred from so doing by taxes and rates that were levied upon his improvements? So far as the land must bear taxation, it should be levied, not on the total value, but on the unimproved value alone. Under this system, which was introduced in 1891 in the place of the previous property tax, the occupiers of land have every encouragement to improve their properties, as, the more they do so, the smaller becomes the proportion of the total value of their estates on which they are liable to taxation. The abstract principle of the taxation of land values cannot of course here be discussed. It is sufficient to signalise the fact that the Government of New Zealand aim, through taxation as well as otherwise, at the expansion of the enterprise of the community. They were also in favour of a similar reform in regard to the assessment of local rates, but they preferred to proceed by a permissive measure in order to avoid any appearance of dictation. Under this Act, which was passed in 1898, thirty-three boroughs, including Christchurch and the capital city of Wellington, and thirteen counties, levy their general rates upon the unimproved value of the land alone.

New Zealand is also worthy of attention for its

legislation affecting the relations of employers and employed. There is a long series of laws which aim at ameliorating the position of the worker by preventing social oppression through undue influences, or through unsatisfactory conditions of sanitation. The most prominent instance is the Industrial Conciliation and Arbitration of 1894, which, introducing compulsion where it had previously been regarded as inapplicable, has certainly averted any serious strike or lock-out in New Zealand for a period of ten years. The Act has been fully described,[1] and its effects analysed, by the Hon. W. P. Reeves, who was mainly instrumental in placing it on the statute-book.

A similar trend of thought and legislation is to be found in Australia; but New Zealand has been selected for this brief account, because space would fail for a description of the action of each of the Australian States.

The policy of Australia and New Zealand in regard to railways and other public works is altogether different from that of Canada. Instead of offering inducements which attract private enterprise, the State, in the vast majority of cases, borrows the money and retains the undertaking in its own hands. In this way, it is contended, the extension of means of communication is more closely associated with agricultural development. But, under intensely democratic constitutions, the danger of undue pressure by constituents upon

[1] "State Experiments in Australia and New Zealand," vol. ii. pp. 69–153.

their representatives becomes at once apparent; and it would not be true to say that Australia has escaped scot free. The evil, however, has been met by at least a partial remedy; and, in the study of the science of government, there is nothing more interesting than an examination of the safeguards by which Australians have sought to minimise the perils, while retaining the benefits, of collectivist legislation. The main object has been to place the control over public works and public servants in the hands of permanent and non-political bodies. The railways are, in several instances, managed by one or more commissioners, appointed for a fixed period, who are irremovable except upon a vote of both Houses, and whose salaries are charged upon the consolidated revenue fund. Similarly constituted boards regulate appointments and promotions in the Civil Service, and in New South Wales, where frauds have been disclosed in the Lands Department, this department also is likely, in view of the popular indignation, to be removed altogether from political influences. Some of these bodies, it must be added, have not been reappointed when their term of office had expired; but the general tendency is certainly, in spite of temporary reactions, for the several Parliaments to recognise their inherent soundness, as protecting representatives from their constituents where protection is requisite. In Victoria, moreover, legislation with the same intention has been carried a step further. If the elector who clamours for public works is to be dreaded, much more so is the elector who is

also a servant of the State, and particularly so when, the activities of the State being very wide, there are thousands of such persons. All these electors have, therefore, been taken out of the constituencies in which they would normally vote, and placed in constituencies by themselves. In this manner their interests secure due representation, while the community is freed from an insidious influence which was becoming an active menace to its political integrity.

From the consideration of the results which have flown from the construction of public works by the State, it is natural to turn to the public works themselves. The railways, owing to the nature of the country, have not called for any particular display of engineering skill ; but there is one noteworthy enterprise, the Coolgardie Waterworks, which proves that Australians are not backward in that respect when the occasion demands it. They were rendered necessary by the situation of the gold-fields, which are in an arid district, with an average annual rainfall of less than 8 inches. Before, however, the great scheme was authorised, every attempt had been made to obtain a sufficient supply locally. Tanks had been constructed; the salt water in the mines and in the so-called lakes had been condensed ; and bores had been sunk to a depth of 3000 feet, but without any appreciable success. In the meanwhile, and especially upon the completion of the railway to Coolgardie in 1896, not only did the railway require a large amount of water, but the growing population and

the increasing number of mines, which had reached the productive stage, intensified the strain upon the existing supply.

In these circumstances Sir John Forrest, the Premier of Western Australia, induced the Parliament of the Colony to authorise, at an estimated cost of £2,500,000, a scheme for the transportation of water to the gold-fields from some spot upon the coastal range in the neighbourhood of Perth. The undertaking was daring in its magnitude. The water must first be collected and detained by a barrage; then it had to be carried 330 miles to a point 1200 feet above its point of departure. The technical details of execution cannot here be given.[1] It will suffice to say that the pipes, which were of a pattern invented in Australia, were manufactured in that country, and that the pumping machinery was the work of an English firm. So difficult, moreover, was the nature of the ground that it was impossible to drive the water for the whole distance by one pumping plant. Eight substations were erected, at each of which there was a complete installation for the reception of the water and its transmission to the next station, together with an additional installation for use in the event of a breakdown; and the whole undertaking, which was carried through without a single accident and in a brilliantly successful manner, has cost very little more than the original

[1] They will be found in an article entitled "An English Engineering Triumph in Australia," in *The World's Work*, for October 1905.

estimate. It is true that, owing to the consumption of water being less than had been anticipated, the State has to contribute from its general funds towards the interest on the loan. On the other hand, the mines are computed to have saved in the first year £360,000 upon the cost of the water that they consumed, while the inhabitants of the gold-fields, who had previously suffered from outbreaks of typhoid fever, now enjoy a regular supply of pure water.

As the crown colonies have still to be considered, but little space can be spared for South Africa. There are, however, many recent books which direct attention to what is being done, and to what should be done. Mr. Willcocks[1] has discussed the whole subject of irrigation in a masterly report. Mr. G. J. Hutchinson[2] has written upon agriculture in Rhodesia; Mr. Owen Thomas[3] upon the general prospects of agriculture in South Africa. Moreover, the chief industry of the sub-continent, the extraction of gold in the Transvaal, must be passed over because it involves, in the question of Chinese Labour, a controversial element which should not find a place in these pages. But, since it is based upon the supply of labour available in South Africa, the industrial organisation at Kimberley may be mentioned; and it is worthy of commendation from the scientific point of view, because the De Beers Company represents the

[1] Report on Irrigation in South Africa.
[2] "From the Cape to the Zambesi."
[3] "Agricultural and Pastoral Prospects of South Africa."

successful consolidation into one vast undertaking of a number of unprofitable enterprises, and because, owing to the limited nature of the demand for diamonds, the industry has to be worked upon the nicest computation of the supply that the market will absorb at a remunerative price.

The most important problem before the Government of South Africa is that of the best policy to be adopted towards the natives. According to the census of 1904, the whole of British South Africa to the south of the Zambesi contained a population of 1,135,016 Europeans, 4,652,662 natives, 434,629 coloured persons, and 110,884 Asiatics. Of the natives, 467,142, along with a European population of no more than 1899, were in the Bechuanaland and Basutoland Protectorates, which, under the direct authority of the Imperial Government, are administered mainly through the agency of the local chiefs. In the colonies proper the disproportion between the natives and Europeans ranged from about nine to one in Natal to five to three in the Orange River Colony. All of them, therefore, together with Southern Rhodesia, which had 591,197 natives to 12,623 Europeans, are vitally interested in this question, which is most likely to find a satisfactory solution if concerted action is taken in regard to it. With this object the High Commissioner appointed in 1903 a representative Commission, with a comprehensive reference for the study of all matters affecting the welfare of the natives. The Report,[1] which well repays perusal,

[1] Cd. 2399.

explains the systems of land tenure in the different colonies, and makes recommendations in the direction of greater uniformity. The tribal system, in connection with native law and native custom, is fully discussed. The benefits of education to the natives are recognised, and the establishment of a central native college is advocated. The sale of spirituous liquors should be absolutely prohibited, the only exception being in favour of a weak concoction of Kaffir beer because it has strong nutritive elements. Perhaps the most difficult question before the Commission was that of political representation, because in Cape Colony and Southern Rhodesia the natives are admitted to the franchise on equal terms with Europeans, while elsewhere they have practically had no direct representation. The system in vogue in Cape Colony, it was agreed, could not be approved as a general model. It was there only a question of time for the natives, owing to their great numerical preponderance, to swamp the votes of the Europeans. On the other hand, as the natives had once been made eligible for the franchise, there could be no permanence in a solution which excluded them altogether; nor would it be right, as, even under their own institutions, most of the tribes had had weighty councils which partook of a representative character. A compromise was, therefore, arrived at which would grant compensation in Natal and elsewhere as self-government was extended, for the limitation of the existing rights in Cape Colony and Rhodesia. It is thus described in the Report :—

"The central idea of the scheme, in favour of which there is entire unanimity among the members of the Commission, is separate voting by Native electors only for a fixed number of Members to represent them in the Legislatures of the country, with the same status as other Members; the number and qualifications of such Members to be settled by each Legislature; the number not to be more than sufficient to provide an adequate means for the expression of Native views and the ventilation of their grievances, if any, and not to be regulated by the numerical strength of the Native vote; no Native to vote at the election of any Candidate or Member who is to represent Europeans; all Colonies and Possessions in South Africa to adopt the plan as they become self-governing."

The idea has been borrowed from New Zealand, where the Maoris have separate representation, namely, four Members out of a total of seventy-four in the House of Representatives. But, whereas, this is the number to which they are entitled on a strictly numerical basis, there is no suggestion of such a basis in South Africa, which, indeed, would place the natives everywhere in a larger or smaller majority. On the whole, however, the principle of separate representation is probably the least unsatisfactory solution, where no solution can be unexceptionable.

The Commission was appointed in anticipation of the approaching federation of British South Africa, and the federal conception is seen in its

recommendation of periodical conferences of representatives of all the colonies and protectorates, to report upon matters affecting the native population that would be valuable in the unification of native laws and administration.

The first practical step towards federation was taken when Cape Colony, Natal, and the Orange Free State formed themselves into a Customs Union; the next, when the railways and the constabulary of the Transvaal and Orange River Colonies were placed under an inter-colonial council. Since then, the Customs Union has been extended by the inclusion of the Transvaal and Southern Rhodesia, and representative conferences on various subjects are gradually paving the way for a closer union.

Passing now to the last branch of the subject, the crown colonies, it is to be remembered that, not only the Governors, but the principal officials, are directly appointed by the Government of the United Kingdom, which has a complete and undivided responsibility. Whatever may be thought of the value of the electoral power enjoyed, for example, by less than one per cent. of the population of Barbados, it is generally agreed that full self-government is out of the question in any of the crown colonies; and, as the possession of legislative power without control over the executive generates friction, without any adequate benefit to outweigh it, the prevailing tendency is to prefer Crown Colony Government in the strict sense of the word. It means that, though a few unofficial

persons are nominated to the councils, they are always in a minority, and are liable at any time to find that their advice is disregarded.

But, before proceeding to consider how the Government at home or in these colonies is carrying out its duties, it is expedient to mention the action of certain societies. The London and Liverpool Schools of Tropical Medicine have done a most useful educational work among those whose lives are to be passed in the tropics, and they have equipped expeditions for the study of tropical diseases on the spot. In various ways, also, the Medical Schools of the United Kingdom, the Royal Society, and the General Medical Council, are seeking to extend the knowledge of tropical medicine and hygiene, and the Colonial Nursing Association has systematised the supply of trained nurses to hospitals in the tropics. The writer will not, however, enlarge upon this category of activities as it has been described in a recent address by Sir Charles Bruce.[1]

The British Cotton-growing Association was formed in 1902 in view of the danger to manufacturers of cotton of dependence upon a single source for their supplies. It secured at once the co-operation of the Government, which now provides free transport for cotton grown by the Association over the railways of West Africa; and small grants are made to the Association by the Governments of Sierra Leone, Lagos, and Southern

[1] *Proceedings of the Royal Colonial Institute*, vol. xxxvi. pp. 224–27.

Nigeria. In return, it has undertaken to buy all seed cotton offered for three years at 1d. a lb., provide ginning and expert instruction, establish plantations, and expend £10,000 annually for three years in each of the above-mentioned colonies. But the best results have so far been obtained, not in West Africa, but in British Central Africa and in the West Indies, which have turned out cotton of excellent quality and conforming to the requirements of Lancashire. The Government, it may be added, have made an increased grant to the Imperial Institute for the purpose of experiments in regard to cotton.

Their general action towards the crown colonies cannot profitably be discussed until some idea has been formed of what can rightly be expected of them. The scientific development of these countries must be carried out at the expense of the local taxpayer, or by grants-in-aid from the Government of the United Kingdom. As to the local resources, they are, in the majority of cases, extremely limited, and progress must necessarily be slow in the absence of extraneous assistance. The only marked exception is the Federated Malay States (not strictly a colony), which, owing to their valuable tin mines, raise an annual revenue of nearly $10,000,000 from an export duty on tin. Their finances are in a most flourishing condition, and they have been able to construct railways out of their current resources. But, in the less satisfactory cases, it is arguable, in view of the domestic requirements of the United Kingdom, how far

the British taxpayer, who already provides naval defence, should reasonably do more than enable the local governments to balance revenue and expenditure. This obligation, which is unquestionable, already imposes a heavy burden upon him. Here are the figures of direct grants-in-aid of revenue for the last five years, omitting the sums paid to the Transvaal and Orange River Colony in connection with the war, and omitting also, from considerations of space, the explanations attached to the votes in the estimates :—

	1901–2	1902–3	1903–4	1904–5	1905–6
	£	£	£	£	£
Uganda	172,000	135,000	130,000	139,850	103,000
British Central Africa	50,000	50,000	48,000	36,800	32,000
British East Africa .	93,000	244,000	256,000	251,133	214,000
Somaliland	—	25,000	50,000	24,600	76,000
Gold Coast (Northern Territories) . .	30,000	25,000	20,000	23,000	15,000
Northern Nigeria . .	280,000	290,000	405,000	405,500	320,000
West Indian Islands (Deficiency of general revenue) . .	20,300	20,000	7,000	—	17,000
Bechuanaland Protectorate . . .	68,000	68,000	44,000	15,000	36,000
Wei-Hai-Wei . . .	11,250	12,000	9,000	6,000	3,000
Cyprus	16,000	30,000	87,000	—	16,000
	740,550	899,000	1,056,000	901,883	832,000

At this stage it need only be mentioned that the prospects of the African protectorates and colonies should be better now that all have been placed under one central administration, that of the Colonial Office; and that the Treasury keeps a very strict hold over the disbursement of the grants-in-aid. Lord Hindlip states, in an article upon

the East African Protectorate,[1] that the amounts are portioned off for the various departments and stations, and are so strictly allocated, that no sum in excess of £100 can be transferred without permission from one purpose to another.

The expenditure considered so far varies from year to year in accordance with the estimates laid before the House of Commons; but Imperial funds are also pledged to repay by annual instalments of £44,475 for twenty-eight years, the sum of £820,000 advanced to the Royal Niger Company in compensation for the relinquishment of its governmental rights; and to pay more than £300,000 annually for thirty years, whereby the capital expenditure upon the Uganda Railway will be extinguished. The debate in Parliament (1899) shows that the Foreign Office blundered badly over the charter of the Royal Niger Company. Though it had been intended explicitly to prevent the establishment of a trading monopoly, the Company had in fact secured it, and the law officers of the Crown advised that it was within its rights. Freedom could, therefore, only be regained by an arrangement with the Company under which it would surrender its charter. The construction of the Uganda Railway was agreed to by Parliament (1896) upon altogether inadequate information as to the difficulties and the probable cost of the undertaking. The estimate was then fixed at £3,000,000; the actual expenditure has amounted to £5,311,000.

[1] *The Empire Review*, Oct. 1905.

It cannot fail to have been noticed that the two items of capital expenditure, and almost the whole of the exchequer grants, are concerned with those parts of Africa that are within the tropics. These territories were no doubt brought under British influence mainly in order to forestall foreign rivals. "If other nations," as Mr. Chamberlain has put it,[1] "would only stand aside, it might have been wiser that we should have proceeded more gradually, and that we should have developed the countries we already possessed before seeking this vast extension." Mr. Chamberlain consoled himself, however, with the reflection that "all our colonies and protectorates are either self-supporting from the first, or become so in a very short space of time."[2] This, unfortunately, is not the case with the most recent acquisitions, as is shown abundantly by the figures given above; and the writer ventures to think that a thorough examination of the whole position would be advisable. He has not only in view the small rate of diminution in the aggregate of the grants-in-aid, he also suspects the existence of false economy, where a comparatively insignificant additional outlay would soon bring in a double return, in the relief of the British exchequer and the more rapid development of the country concerned. Mr. Lyttelton stated[3] in the last session of Parliament that an extra £5000 or

[1] "Foreign and Colonial Speeches" (authorised edition), p. 143.

[2] *Ibid.*, p. 145.

[3] "Parliamentary Debates," vol. cxliv. p. 564.

£10,000 could be profitably expended in Northern Nigeria in prospecting and discovering; but "these were lean years, and it would be useless to apply to the Treasury for more money."

It may be contended that all requisite information is provided in the explanations attached to the estimates, and the reports on the blue-books of the several colonies and protectorates. But, apart from the fact that these reports are published several months after the money has been voted, there is no general survey of the position such as is provided in Germany by the annual memorandum "on the development of the German protectorates in Africa and the South Sea."

On the question of the best means of ensuring, on the one hand, that Parliamentary grants in aid of administration shall be kept at the lowest possible figure, and, on the other, that the crown colonies and protectorates shall be developed on scientific lines, it is difficult for one who has no personal knowledge of the working of the House of Commons[1] to make any useful suggestion, but he may call attention to a recent article[2] by Mr. R. M'Kenna, M.P. It is true that Mr. M'Kenna is thinking mainly of the increased expenditure upon the army and the navy, but the arguments apply equally to the Colonial Civil Service estimates. He points out that in France a Finance Committee is appointed for each department, with

[1] Mr. H. de R. Walker has now been elected to the House of Commons for the first time.—ED.

[2] *Independent Review*, Nov. 1905.

full power to examine the accounts, and to obtain all information necessary for a reasoned criticism of the estimates. This system, however, though it works well in France, might not bear transplantation to the United Kingdom, where full governmental responsibility attaches to all proposals made upon ministerial authority. Hence, the only Finance Committee, apart from the House as a whole, is the Public Accounts Committee, which, useful as is its work, is concerned solely with the audit of accounts, and is, therefore, unable to exercise any preventive check upon wasteful expenditure, or to promote advisable expenditure. As the best obstacle to extravagance, Mr. M'Kenna advocates the re-establishment of efficient control by the Treasury under the guidance of a strong Chancellor of the Exchequer. It might also, he thinks, be advisable to set up a Committee to which a Minister could refer matters relating to the estimates at his discretion; and it may be added that matters relating to the Colonial Civil Service estimates would be particularly suitable for such a reference, as not involving, in the majority of cases, any issue of party controversy.

In these tentative suggestions, the writer is groping for some method which shall secure the more economical but, at the same time, more scientific development of the crown colonies and protectorates. When a grave crisis arises in any colony or group of colonies, it must of course be dealt with by a special procedure. Such was the

mission of Sir David Barbour to inquire into the state of the finances of Jamaica; such the visit of the Royal Commission to the West Indies in 1897. The sugar industry, upon which most of the islands depended, was in a state of extreme depression; and the Government, before deciding upon what should be done, wished to have the fullest information upon the situation. And, as the problem was economic, they attached to the Commission Mr. (now Sir Daniel) Morris, who had at one time been for twelve years Director of the Botanic Department in Jamaica. Owing to his technical knowledge and to the ability of the Commissioners, the Report[1] is not only a most interesting document, but it gives a complete analysis of the problem, and a scientific chain of recommendations for its solution. These were accepted by Mr. Chamberlain almost in their entirety, and they met with ready acquiescence on the part of the House of Commons. Space fails for even a brief summary of the recommendations, and it can only be said that the main object was to establish agriculture on a scientific basis. Sir Daniel Morris was asked to take charge of a new Department of Agriculture for the West Indies, which is supported out of Imperial funds. He is consulting officer to the Governments of Jamaica, British Guiana, and Trinidad, and is in charge of the Botanic Gardens, stations for sugar-cane experiments, and agricultural schools in all the smaller islands. The charge under these heads in the estimates for 1905–6 is

[1] Cd. 8655.

no more than £17,544, a mere trifle, in view of the results that are being obtained, if it be admitted, as can scarcely be denied, that the United Kingdom is responsible for the social and financial stability of its colonies in the West Indies. The Department publishes a full record of its general work, and of its special researches, in periodical issues of the *West Indian Bulletin*.[1] To give a very brief summary, it may be said that some seedling canes have been proved to yield more sugar, and to be less liable to disease, than the older varieties; that great attention is also paid to the cultivation of cacao, cotton, rubber, tobacco, and many kinds of fruit; that agriculture is being taught in the primary and secondary schools; that special courses of instruction in agriculture have been held for the teachers; and that agricultural banks are to be established for the benefit of the smaller cultivators. Sir Daniel claims that the experiment has passed beyond the pioneering stage, and that relations of reciprocal confidence have been established between the Department and the producers.

He was trained at the Royal Botanic Gardens, Kew, which also maintain an intimate connection with the botanical institutions in Jamaica, Ceylon, and the Straits Settlements, and have no less than one hundred of their gardeners in official employment in the colonies and in India. The work in the interests of the crown colonies of the present director, Sir W. T. Thiselton-Dyer, and of the Imperial Institute, to which reference has already

[1] To be obtained of Messrs. Dulau & Co., 37 Soho Square, W.

been made, has so many ramifications that a condensed description would necessarily fail to do justice to it.

A more scientific spirit is now also apparent in matters of sanitation and health in the tropical colonies, which is largely due to the efforts of Sir Patrick Manson and Major Ronald Ross. No doubt, very much still remains to be done, and Great Britain can point to no achievement such as that of the Americans, who cleared yellow fever, malaria, and mosquitoes out of Havana, and claim to have been equally successful along the route of the Panama canal. But Sir William Macgregor worked wonders in Lagos, and good results have been obtained in the Federated Malay States and Hongkong.[1] Moreover, in the estimates for 1905–6 there appears for the first time a grant of £500 for the investigation of malaria in the exchequer-aided colonies and protectorates.

Where the importance of such matters is imperfectly realised, the blame attaches largely to the system under which the higher officials are appointed. Competitive cadetships have been established in Ceylon, Hongkong, the Straits Settlements, and the Federated Malay States, with a view to training up officers to fill eventually the most important posts in those colonies and states. And these eastern places are certainly those in which the Colonial Civil Service is the most efficient. If the juniors have no special knowledge

[1] *Cf.* Major Ronald Ross : "Malaria and a Moral," *University Review*, May 1905.

of the Tropics, they acquire it through continuity of employment before they become eligible for the higher appointments. On the other hand, in tropical Africa, in the West Indies, and elsewhere, the nomination of the Secretary of State appears to be the only qualification for entrance into official life. The writer is not aware why the system of competition should not be universal, though he does not suggest that it alone would necessarily give satisfactory results. Indeed, it is a favourite theory of his that candidates who have qualified in competition for service in the Tropics should, before proceeding to their posts, be required to go through a course of study in tropical administration.

Finally, in the impossibility of giving a record of the scientific work done in each of the crown colonies, a few particulars are appended, as typical of the problems which have to be faced, in which the High Commissioner of Southern Nigeria summarises the progress of the Protectorate in 1904 :—

"The continued increase in the trade and revenue, which enabled a sum of no less than £93,000 to be devoted to extraordinary public works, and also the payment of a largely increased contribution of £50,000 towards the cost of the administration of Northern Nigeria.

"The Forestry Department is now fully organised and capable of exercising an efficient control over timber-cutting, and, in a lesser degree, over the proper tapping of rubber-bearing plants.

"Many articles used in trade, building, education,

transport, &c., have been placed on the free list, and exempted from Customs duties. Large permanent buildings have been erected for residential schools at Calabar and Bonny, and more Government schools have been opened in the interior. The first Government schools for girls have been established at Warri and Sapele. The chief difficulty in extending educational work is the scarcity of teachers.

"The first land telegraph lines were opened during the year, and have proved of very great use both to the Government and the public, although interruptions on some sections have been unduly frequent. The rate charged for messages is only one penny a word with the *minimum* charge of one shilling. This, of course, is not remunerative, but the low charge is expected to develop traffic, and the lines have been constructed more with a view to helping efficient administration, and as a convenience for the commercial community, than as revenue-producing factors.

"The construction of properly formed cart-roads with no gradients exceeding 1 in 20 has been commenced, and a road construction department organised.

"The civil police force has been largely increased, and has replaced the military at many stations.

"The mineralogical survey of the Protectorate has been well started, and several valuable results obtained, but the interior portions as yet unexplored are more likely to yield remunerative results.

"Surveys for a more accurate map of the Protectorate have made satisfactory progress.

"Works designed to improve the sanitation of all the stations where Europeans reside have been continued with most satisfactory results."[1]

The writer has touched upon a large number of questions without treating any of them, perhaps, adequately. The alternative was to confine his attention to a few of them, while leaving much of the ground uncovered. But he believed that he would better carry out the task that had been entrusted to him by sketching certain broad lines which would elucidate the general trend of Colonial Development.

[1] "Colonial Reports" (Cd. 2684–5).

SCIENCE AND INDUSTRY

J. A. HOBSON, M.A.

UNTIL comparatively recent times the natural sciences were pursued largely in a spirit of disinterested curiosity for the intellectual fruits they were capable of yielding. Though astronomy afforded important utility in the calculations of time and seasons and in the art of navigation, while geology, chemistry, and physics made incidental contributions to the arts of industry, these studies served through the Middle Ages chiefly to feed a romantic intellectualism in the learned classes: though botany, zoology, and other organic sciences more closely subserved certain direct uses of humanity, they entered very slowly and slightly into industrial reform. Even mechanics, though more definitely utilitarian in origin than other sciences, was largely perverted to purposes of more or less futile ingenuity, and yielded little economic service until the era of the industrial revolution.

The domination of industry in modern times, and the eagerness to wrest as quickly as possible from all the natural sciences the industrial aids they are capable of rendering, have grown so insistent as even to threaten the larger liberty of

natural growth which is favourable to the true advance of knowledge.

Industrial utility is everywhere imposing new valuations upon the sciences and new directions to their conduct, diverting a larger and larger proportion of intellectual energy to those branches which promise quick results in the shape of profitable industrial inventions.

Though a narrowly utilitarian reign of science is fraught with two dangers, the imposition of a short instead of a long range of human utility, and the interpretation of utility too exclusively in terms of economic values, the rescue of the sciences from vague intellectualism and the harnessing of them to clearly conceived human services is the greatest achievement, as it is the most important condition, of modern progress. While each science needs to retain an advance-guard of free explorers, not hampered in their inquiry by conscious motives of utility, but simply devoted to "the advance of science," an army of less ambitious workers will be continually engaged in assimilating their discoveries, and applying them to the various arts of life, and in particular to the arts of industry.

How fast the arts of industry are becoming dominated by the natural sciences is apparent from the place taken by the engineer, the chemist, and the electrician, in large fields of industry. Take any highly evolved modern manufacturing business, you will find these men performing two important functions, the one concerned with maintaining order, the other with securing progress.

All industrial arts may be brought under the two heads of repetition and invention, and the part played by the sciences in these two sorts of activity deserves separate consideration.

The overwhelming majority of human activities in industry have always been directed to repetition, a multitudinous iteration of the same act directed to the production of an article precisely like the one last produced. Since nature never repeats herself exactly, the material to which labour is applied, and the conditions under which it is applied, are never so completely uniform as to permit imitation to be absolute; some choice, discretion and intelligent direction is thus involved even in the most monotonous act of industry. What happens when a process is taken over from a handicraft by a machine is evidently this: the labour of the machine-tender is more exactly repetitive than was that of the handicraftsman, a portion of the skill, discretion, &c., being handed over to a group of engineers and overseers, responsible for the regular and economical working of the machinery. In the routine conduct of a great modern manufacture, *e.g.* a rolling-mill, a dye-works, a chemical factory, we can distinguish directly associated with the productive operations three sorts of workers. First come the engineers, chemists, and others, whose business it is to test and regulate materials, machinery power and products; secondly, the machine-tenders; thirdly, the rough or "unskilled" manual labour of carrying, sorting, packing, &c., which it does not yet pay to do by

automatic machinery. Just in proportion as an industry has become thus differentiated do we recognise the control of science. What science has contributed here is a quicker, cheaper, more exact imitation or repetition than was possible under handicraft. The chief agent in this economy is power-driven machinery, the chief work of the scientific workers being devoted to the regulation of the power and the machines.

From the statical standpoint the control of science over industry may be measured by the degree of "standardisation" attained in the several branches. Just in proportion as exact grading and other quantitative measurements can be applied to the materials and the power exercised upon them in the several processes, do we get the conditions of scientific industry. The limitations upon this progress of standardisation are derived from inherent irregularities of materials, of process, or of consumers' demand. Where the raw materials admit of accurate grading, or where slight natural irregularities can be ignored, as in the main branches of the textile and metal trades, or in milling, mechanical production is most advanced, provided always that a sufficiently large, accessible, and reliable market exists for the products. Where there is lack of close uniformity in shape or quality of materials, as in the case of skins for tanning or of certain ores in mining, this irregularity defeats the subtler uses of machinery, requiring a more constant application of man's choice and skill in workmanship. Again, since no

machine is or remains perfect, many mechanical processes continue to require the co-operation of a human tender or assistant, though new automatic machinery is constantly displacing such labour. In the most highly evolved modern transport trades the conditions of the processes still require the machine-tender of the locomotive to exercise qualities of skill and discretion which have almost disappeared from the tender of stationary engines.

But while new economies of mechanics and chemistry are continually conquering the limits set by these irregularities of material and process upon scientific industry, the irregularity of consumers' demands is in some respects a more obstinate barrier to the displacement of human art.

The unification and the differentiation of humanity, the two opposite and complementary processes of social evolution, imply a corresponding uniformity and diversity of wants and needs. Now, while the former process favours mechanical production, the latter negates it. The first condition of mechanical production is the existence of a large, regular demand for routine products, and this implies identity of needs and desires. In so far as a common standard of consumption is accepted by large masses of men, living under similar conditions, standardisation of production is possible. One tendency of modern civilisation is assuredly in this direction, imposing a certain conformity in modes of life. But another tendency is certainly towards greater individuation,

the insistence of each person in expressing his personality through a demand for the satisfaction of those particular needs which mark him out as distinct from other persons. As men grow more cultured, they come to value this individual satisfaction more; a society of such men becomes more varied and more changing in the kinds and quantities of the goods and services they buy; they want not only pictures, music, and books adapted to their special tastes, but clothes cut to their particular fit, and other goods accommodated to their personal needs or fancies. Now, just in proportion as the consumer thus expresses his need for individual consumption, does he defeat the economy of mechanical production, and restrict the invasion of science into arts and handicrafts. If I consent to sink my own individuality in regard to the food I eat, the clothes I wear, the house I occupy, the furniture I use, falling in with the average taste of the persons of my class or income, all these material wants can be, and, in the present condition of industry, will be supplied by machine production. If, on the contrary, I insist on the satisfaction of those little differences of fit, taste, and fancy which distinguish me from other members of my class, I make a demand for hand-made goods, and some skilled worker must execute some special order to meet my demand. Most consumers, of whatever class, do not, in point of fact, seek to express their individuality through eccentric demands for the prime material necessaries and conveniences of life. Even wealthy

people, for the most part, eat and wear and use the sort of things common to most others of their class; and even where they exercise some individual taste, as in the preparation of food, the cut of dress, or the make of furniture, the art or individual skill demanded is confined to the last stages of production, and is grafted on to a foundation of routine processes executed ever more and more by machinery.

An ever-growing proportion of the articles in common use among civilised nations are therefore made by industries which in their main branches have been thoroughly mechanised and standardised, that is to say, converted into applied sciences. To all these great departments of routine industry, the physical sciences, especially mechanics, physics, and chemistry, have introduced machinery, motor power, and modes of treating materials which are all based upon the measured control of natural energy.

If we confine industry to the trades concerned with making and moving material goods, science has made the greatest advance in the manufacturing processes which supply the prime necessaries and conveniences, or construct the machinery subsidiary to these processes—the milling, textile, and metal trades, and in the main transport trades by land and water which carry these materials and products. Here are the best standardised and graded materials, the largest and most regular markets. As we rise to higher elements in the ordinary standard of comfort, ascending to the

comforts and the luxuries, the smaller size, the fluctuating and irregular character, of the markets limit the economical use of machinery, the highest forms of luxury containing, as a rule, a minimum of machine production. The difference is well exhibited in the book-industry, where, side by side with the most elaborated machine productions, we have a demand for books made of hand-made paper, with hand-made type, printed, folded, and bound by handicraftsmen.

The mechanisation of all carrying processes, with the attendant abolition of beasts of burden and of draft, has no assignable limit. Confined at first to large routine traffic along main roads of commerce, it extends its area until the most irregular demands of individuals are supplied by public or private transport companies, operating huge areas by their minutely reticulated services. When to the mechanical distribution of water and lighting we add the modern telegraphic and telephonic apparatus, we recognise that the largest single service science has rendered to modern man lies in the mechanisation of processes of transport; by extending, quickening, regularising, securing, and cheapening the carriage of men, materials, and information, it has within three generations enlarged enormously the liberty of man.

Refractory and irregular materials or conditions of work have prevented so large a standardisation of the extractive as of the manufacturing arts. Agriculture and mining can never be reduced to mere routine; for in the one case the production

and care of organisms defies mechanics, in the other, geological anomalies cannot be ignored without too great waste in production. But, though complete mechanisation is here impossible, some of the greatest economies of modern science are devoted to these industries. In mining, mechanics and chemistry have reduced to a minimum of human labour the carrying and even the hewing processes, though the best mechanical methods are only economically feasible where cheap human labour cannot be procured.

In agriculture the organic sciences of chemistry, botany, and biology in co-operation bid fair to produce economies even more important than the growing contribution of agricultural machinery. If the new biological sciences can get a firmer grip upon the education of the consumer, so that a new economy in the consumption of foods and other raw materials can co-operate with modern reforms in agriculture, the greatest of all industrial triumphs will be scored by science in the virtual abolition of the reign of the dismal law of diminishing returns. For there is now reason to believe that modern agriculture, stock-breeding, and pisciculture can so turn to human account the natural law, according to which lower species multiply faster than higher species, as to provide from land and water a continually increasing quantity of food for man at a diminishing cost of human labour.

But science not only rules large sections of those productive processes commonly classed as

industrial; it has invaded the dominion of the fine arts. Photography, in part a substitute, in part an auxiliary of the graphic arts, best illustrates this mechanical invasion; the pianola and other copying mechanisms are destined to occupy a similar position with reference to music; in sculpture machinery is taking over from the artist all the harder preparatory work.

But the engineer, the electrician, and the chemist are not the only sorts of scientists whose skill and knowledge are utilised in modern industry. Every objective act of industry concerned with the application of human or mechanical energy to the making or moving of goods is registered and regulated by some act of book-keeping and finance. Accurate measurements of values, the operation of the elaborate system of money and of credit, methods of insurance, the financial apparatus of markets and exchanges, occupy a place of ever-growing importance in the modern industrial world. The actual power of the financier, in his legitimate part as director of the flow of free capital and labour, is pivoted in the present system; and the army of bankers, brokers, insurance firms, valuers, actuaries, and accountants, who co-operate with him in operating the monetary instruments, represent an application of science as important and as progressive as any of the contributions of the physical sciences. The science of statistics as a basis of finance, and the logic of book-keeping, slowly evolved through the Middle Ages, are receiving

great accessions of utility in recent times, in order to fit the modern business man for the more complex operations in which he engages.

The processes which have been described may conveniently be summarised under the head of Capitalism, for modern capitalism is the concrete industrial expression and embodiment of science, organised mentality applied to the production of wealth. It means the substitution of complex, indirect, more productive, for simple, direct, and less productive methods, and involves radical changes in the structure as well as in the working of industry.

The first of these structural changes consists in an increased size and complexity of every unit of industry. The effective business under capitalism, whether for extraction, manufacture, transport, commerce, or finance, is larger in the mass of productive energy it employs and in its output: it draws its materials, its instruments, and its labour from a wider area and a larger variety of sources; its processes are more numerous, more specialised, and more carefully co-ordinated. It is essential to capitalist production that capital contributes a larger and labour a smaller part than in more primitive industry. What holds of the business unit holds also of the group of businesses we call a Trade. The size and area of a capitalist trade is greatly extended: the group of effective competitors, once comprised within a single town or a small district, now extends throughout a whole country, or, leaping political

barriers, becomes international. As means of communication and modes of preserving natural products improve, effective world-markets are established, not only for durable and costly goods in universal demand, such as the precious metals and the more expensive luxuries, but for the grains, meats, fruits, and other foods, for the ordinary materials and production of the textile trades, and for large numbers of other materials which enter into the standard of consumption of the people in all civilised nations.

The industrial world itself, as a single economic system, is reorganised by science on a larger and more complex scale. Large new tracts of land and populations, formerly outside world commerce, are continually annexed : the development of railroad and steamship routes strengthens and regularises contacts which were slight and casual, improved systems of commercial intelligence and of finance impart an increased unity to the world of commerce.

But the increased volume and facility of material commerce throughout the world are not the most significant achievements of modern industrial science. The growing internationalisation of capital and labour is playing a still larger part in the consolidation of the economic system on a world basis. Free capital and free labour, flowing over the face of the earth, seeking the most remunerative employment, represent a vast exploring force making for the fullest exploitation of the natural resources of the world, and destined

in the long run to subserve the economic interests of the world of consumers.

It must not, however, be supposed that the applied sciences of mechanics, chemistry, &c., occupy or are destined to occupy the greater part of the field of the wealth-producing energies of man. The notion that all the manufactures are being absorbed by the factory system and are passing into the form of great industries, that all the workers will gradually become employees of huge joint-stock companies, employing the most highly-evolved machinery and the most scientific organisation, is a false generalisation which finds no support from the current statistics of occupations. We may not accept fully the analysis of modern tendencies presented by Kropotkin in his volume, "Fields, Factories, and Workshops," in which it is argued that centrifugal forces already so far possess the upper hand that, not only in agriculture but in most branches of manufacture, the small business, intelligently ordered and combining personal industry with the utilisation of scientific resources, can outstrip great industry alike in productivity and profit. But when, turning our eyes away from the dramatic rise of the gigantic trusts and companies, we survey more calmly the industrial field, we perceive not merely the survival of large clusters of small businesses in the older industries, but the growth of new industries on a basis of small production. Those who contemptuously dismiss the small or domestic workshop as a morbid and obsolescent form, kept

alive by cheap labour and the "sweating system," ignore the more important causes making for the persistence of small privately-ordered businesses. One of these causes I have already indicated when alluding to the limits set upon machine-production by the circumstances of certain trades, involving irregularity of material or artistic skill in workmanship. Every great staple trade, itself organised in some large capitalist form, is attended by a swarm of small subsidiary businesses which undertake the minor branches of the trade, executing special orders or repairs. So far as business organisation goes, the bonds between these small businesses and the great companies is often close; but in the metal trades of such centres as Birmingham and Sheffield a vast amount of industry remains in the hands of small men. In the higher departments of the furniture, the clothing, clock-making, jewellery, and indeed in most "luxury" trades, the nature of the skill required involves the maintenance of small arts and handicrafts.

But we may go further and point out how certain centralising tendencies of science especially associated with the Industrial Revolution which drove industry into large businesses show signs of reversal. The economy of steam-driven machinery for manufactures obliged the organisers of industry to collect great masses of capital and labour in close confined areas, and led to the erection of industrial cities based, not upon convenience of living, but upon economy of working.

Even under the steam economy certain decentralising forces began to express themselves: the expense of maintaining large central premises for factories, and of paying wages sufficient to cover high rents for working-class dwellings, has long been effectual in driving large manufactures away from the centres of large cities, and has often led to a re-establishment of industrial villages. Far more important consequences attend the substitution for steam of some other power capable of retail employment at a smaller rate of waste. The cheap generation of industrial power upon a small scale, or the cheap distribution for industrial purposes of industrial energy generated from given centres upon a large scale, is perhaps the most far-reaching industrial reform within sight. The earliest waves of this new industrial tide consisted in the invention of small-power engines worked by gas or oil, enabling small businesses to compete more effectively than before with large businesses. But the near future, by presenting a combination of highly-centralised production with cheap and effective distribution of power, may give an enormous impetus to the decentralising tendency in manufacture. This is the great electric problem which confronts civilised nations. If a cheap production of electric energy, owned or controlled by the public, can be cheaply distributed in small quantities over large areas for industrial purposes, a counter-revolution will be set on foot which will profoundly modify the entire fabric of modern capitalism, re-establishing

large numbers of substantially independent producers, and restoring free competition in industries where the economy of large-scale production with a control of the best sources of power had led to the establishment of monopolies.

If the waste of subdividing and conveying industrial power can be got down to a low level, and this economy is administered for the public good, instead of furnishing another and a more enduring basis of private monopoly, it may do a larger work for industrial democracy than any that has yet been done. Not only would it contribute directly towards equality of economic opportunity, by diminishing or even annulling the advantage possessed by the big capitalist over the small capitalist, but it would, by spreading industry and population more evenly over large areas of land, tend to equalise land values and to reduce the aggregate of rent. If such distribution of manufacturing power were accompanied by a similarly effective small-scale distribution of transport power, the tendency to break up congested cities and to disperse the industrial population would be still more powerfully operative.

But quite apart from these speculations regarding the new developments of electric science, we are entitled to conclude that capitalism, as the embodiment of scientific forces, is not the all-absorbing power it sometimes appears. The statistics of occupations are most enlightening in their testimony to the limits of mechanically-ordered industry. A survey of the best evidence in all those countries

which have advanced furthest in modern industrial methods clearly proves that, after a certain point of development is attained, the great staple industries employ a diminishing proportion of the occupied population, an increasing proportion engaging in those minor industrial arts, or in commercial and professional pursuits where mechanical conditions do not prevail. This is of course an inevitable result of the labour-saving character of machinery. In the case of Great Britain the enormous expansion of her foreign commerce, due to her early supremacy in the new manufacturing arts, postponed the operation of this tendency: for several generations the new machine-industries offered employment, not only to increasing numbers, but to an increasing proportion of the aggregate of workers. In the case of Germany and Holland and certain other continental nations the great expansion of the home market which followed the earlier falls of prices, due to the adoption of machine manufactures, retarded the fall of employment. But the records of recent censuses in all these countries indicate that the staple manufacturing industries are following agriculture, though at a slower pace, in the diminishing proportion of employment they are affording.[1] Though no fully conclusive statistical evidence is available for the entire volume of machine-industries in manufacture, there is strong reason to believe that a smaller

[1] For statistical evidence upon this fact see a chapter by the present writer in "The Evolution of Modern Capitalism" (Walter Scott & Co.).

number of persons is engaged in operating factory machinery in Great Britain than was the case thirty years ago, and even if we take into full account the operators of machinery in the carrying trades, it seems tolerably certain that the proportion of employment afforded by the entire body of what may be styled machine-industry is diminishing. This of course does not imply that machinery produces unemployment; it means that an increasing proportion of the employed are occupied in work which is not directly mechanical. It may, indeed, be inferred from the very nature of the machine-economy in relation to the evolution of human wants that the reign of machinery over the arts of production of wealth must always remain limited. As our civilisation advances an ever-increasing number of industries are scientifically ordered; but since the very *raison d'être* of this economy is to produce more wealth with a diminished quantity of human labour, it follows that more and more human energy seeks avenues of production outside the mechanical régime, and finds them in those occupations which supply the less materialistic and the less regular elements in the rising standards of comfort of progressive communities.

In a most suggestive chapter of his important book, *Psychologie Economique*, the late Professor Tarde emphasises in the world of industry that fundamental distinction between imitative and creative activity, which is for him the most radical distinction in the whole economy of nature. Everywhere in the inorganic, the organic, the psychical,

and the social order he finds two processes, the one consisting of rhythmic repetition, undulatory, generative, imitative in the several departments of nature; the other consisting of adaptation or ordered variation, as in chemical combination, biotic fecundation, or in conscious invention. Without discussing the ultimate or universal application of M. Tarde's antithesis, or the question how far he elevates analogy into a case of common law, we can hardly fail to recognise the importance of the distinction in relation to the services rendered by science to industry.

The greater part of the machine-economy upon which we have dwelt as the typical contribution of modern science ranks as imitation. This is true not merely in the sense that the function of industrial machinery, and in general of scientific method as applied to industry, is to secure an exact numerous repetition of a single movement or set of movements. It is true in a wider sense. There is exact repetition not only in the action of a machine, but also in the manner in which the idea and use of the machine spread throughout an industry: the idea which first finds embodiment in a single model machine spreads by an imitative action through the entire industrial society, and with this process of expansion comes the fuller social realisation of the new economy. The rapidity and accuracy with which a new machine or method permeates industrial society, by this undulatory or imitative movement, are of course prime conditions of the fullest service which science can render to

humanity; and every new facilitation of material or spiritual contact between races and nations increases this utility of science.

But still more important than this expansive power of science is the consideration of the creative or adaptive work which consists in new inventions. Any improvement in the economy of inventive energy, the fecundation of ideas adapted to human use, is of paramount significance in the theory and the art of industrial progress. There never was much truth in the stories which trace great industrial inventions to suddenly miraculous or casual discoveries. Almost all the serviceable inventions of whose history we know anything reliable grew up by slow accretions, the inventive energy of many minds being directed along certain channels of profitable inquiry and wrestling with the same theoretic or technical difficulties, until at length these are overcome. The number of known instances where several men almost or quite simultaneously reach the goal attests the rightness of this general view. Even where some single mind, a Kelvin, a Siemens, or an Edison makes a number of considerable contributions to the technical arts, the increment which affords success is generally small compared with the common basis of accepted knowledge, and a Marconi is only the first of several close competitors to hit the mark.

Those who have held that the twentieth century was not likely to be so prolific in epoch-marking inventions as the nineteenth, have no ground for their conviction. On the contrary, it seems more

likely that the age of science in industry is but dawning, and that the pace of inventive progress must continually accelerate unless some great *débâcle* of modern civilisation occur.

The reason for this belief lies in the change that has been taking place in the science and art of invention itself. In order to understand the economy of scientific invention, we must ask why it was that so little advance was made in the industrial arts of Europe through the whole period called the Middle Ages. The fundamental discoveries in mechanics and engineering, in smelting and metal working, in spinning and weaving, pottery, and various other crafts, were known in Europe; even the power of steam, though not utilised, was known to antiquity. Long before the modern era Europe was in sufficient touch with the far East to have gained by imitation the arts of printing, gunpowder, paper-making, and other ancient Chinese arts. The real reason why Europe had to wait until the fifteenth and sixteenth centuries for such great inventions as printing, engraving, clocks and watches, the telescope and microscope, and the modern flour-mill, was that the promotion of industrial arts did not seriously occupy the mind of any considerable section of intelligent and educated people. Business is so absorbing an interest to the vast majority of civilised men to-day that it is difficult for us to realise how very modern is this devotion to industry and commerce. The pursuit of knowledge until quite recent times was

chiefly conducted by persons who had no utilitarian ends to serve, a learned or religious class, engaged in philosophical or physical research which had no direct or appreciable bearing on the arts of industry. Comte well drew attention to the fact that the sciences were cultivated in the inverse order of their value to man, being concerned primarily with the exercise of the faculties of man, and with the maintenance of spiritual and temporal authority by decorative and mysterious erudition.

While intelligence and curiosity were directed into these non-utilitarian channels, industry was regarded by those who took part in it as a routine occupation, fixed in methods and restricted in locality, a traditional and largely hereditary means of livelihood. The modern business spirit, that which impels a man to enter an industry as a profitable enterprise, was almost wholly absent from manufacture. For the ordinary "base mechanic" the stimulus to invention was entirely lacking; law, custom, the limitation of market, and a score of other obstacles beset the profitable application of any improvement in production. Not until the rise of the modern entrepreneur with the modern liberty of manufacture and of market, was any considerable pace of industrial progress feasible. Doubtless many rudimentary ideas germinated from time to time in the minds of craftsmen, but until the modern business man arose to exploit them nothing came of them. It is this all-important function of the business-man or entrepreneur that characterises the period of the

Industrial Revolution. For the first time definite encouragement was given to invention. No longer necessity, but profit, was its mother. From this time forward we observe the direction of inventive energy along more or less definite channels of industrial improvement. The progress of the cotton and woollen industries of England during the eighteenth and early nineteenth centuries will illustrate this new economy, exhibiting as they do a fairly regular alternation of the inventive current between the spinning and the weaving processes, so that when one forges ahead the energy of progress is directed to the more backward process. The greatest of the achievements of the seventeenth and eighteenth century, the evolution of the steam-engine, and the early application of steam as an industrial power, were likewise only rendered possible by the stimulus of the new entrepreneur class, directing inventive energy to the solution of each technical difficulty in the order of its appearance.

But in this period of "revolution" we trace the bare beginnings of that science of invention which is destined in the twentieth century to dominate the "evolution" of industry. For in the eighteenth and early nineteenth centuries scientific education was slight and rare, and its fruits irregular; the twentieth century starts with a deep widespread conviction of the mastery of man over nature through the understanding of natural causation. This informed faith in science is a new psychic fact, a new power that will produce immense

results. There is a general conviction of the illimitable control of mind over nature, which in the industrial arts means an orderly attack by trained men upon specific problems of technical economy. The art of invention is now being incorporated in the business structure of a trade; the modern engineering firm, the chemical or dye works, not only collect notions and suggestions from their employees, but keep on the premises specialists, whose function it is to plan improvements and work out new economies. This, however, is but one step in the process of the organisation of invention that is going on. The pace at which any genuinely profitable invention can be utilised through the entire industrial world, by the ever closer contact between members of the same trade in different countries, leads to an immense volume of inventive energy being concentrated upon essential points of progress. Not only is a multitude of minds of different training in every part of the civilised globe simultaneously attacking the same problems in wireless telegraphy, punctureless tyres, or automatic stoking, but they are attacking them in concert through the constantly improved communication afforded by scientific and technical journals and congresses. This improved fertilisation of ideas is a progressive economy of mental power which should exhibit itself in an incalculably great acceleration of the pace of invention.

Here it is right to mention the immense economy of inventive power likely to attend the reformed

methods of scientific education which are removing the barriers between the scientific theorist and the workman. The opening to all of an education in which what is learned in the schoolroom is applied in the workshop, where the "abstract" truths of geometry or physics are given concrete meaning through the use of instruments, where hand and brain are brought into systematic and organic co-operation, such an education will react upon the industrial arts to an extent which can hardly be measured. Every intelligent workman is a potential inventor; let him understand what he is doing he will be impelled to try to do it better and more easily, he will rebel against mere imitation and will seek creation. As soon as we discard the "heroic" view of invention and recognise that it is the most general and the most wasted of human abilities, we shall begin to realise what a truly scientific education may contribute to industrial progress. A hierarchy of scientific research, the hodmen of science, collecting and sifting little heaps of special knowledge and throwing light on detailed problems, the middlemen receiving their results, tabulating and comparing them with results from other sources, the philosophers of science remodelling and restating the more general scientific laws to accord with fuller knowledge—this hierarchy, not standing aside from the work-a-day world in academic isolation, but in vital touch with every industrial art and profession, continually receiving from it new facts and continually vitalising it by new principles and hypotheses, such

is the general character of the scientific economy of the twentieth century.

I have said little about the contribution of science to business method. Yet not the least contribution to modern industry consists in the standardisation of business methods. In the United States this work of planning the structure of a business with reference to its productive work, its supply of materials and power, the size and nature of its market, &c., is already recognised as the basis of a profession different from that of the actual conduct of a business, and the business standardiser has become a specialist summoned as confidential adviser by the foremost manufacturing or commercial firms. A modern business, planned and conducted in this scientific spirit, both in its productive and its financial sides, differs as widely from the ancient empirical type as the modern turbine steamship from the old sailing vessel.

To many I shall seem to have presented an unduly optimist appreciation of the present and possible services of science to industry. They will be inclined, and justly, to question the all-sufficiency of the development of the physical sciences for industrial progress, even when harnessed to the triumphal car of profit-seeking entrepreneurs of the modern scientific order. And it is true that no mere reliance on the omnipotence of the physical sciences under the conduct of skilled profit-mongers can secure the rich harvest which has been described.

Industry, like every other human activity, is a

psycho-physical process, and the effective control and direction of the psychical side requires as close an application of science as those of the physical side. Psychically interpreted, industry consists in the growth and management of ideas and feelings relating to the production and distribution of wealth. Industry involves certain costs or efforts in themselves regarded as undesirable, which are incurred in order to procure utilities or satisfactions. In the psychical calculus of industry we are therefore concerned with the minimisation of costs and the maximisation of utilities. Now while the physical sciences applicable to the material arts of industry have yielded immense gains in reducing the quantity of human energy involved in a given output of commodities, and in discovering and producing new sorts of commodities, it is notoriously true that these productive powers, placed at the disposal of man by modern science, are very incompletely utilised. Wherever the best-developed machinery and power are widely applied to industry the recurrent phenomenon of over-production appears; in all the most advanced staple industries it is found to be impossible to keep the whole productive power in full employment, because it is impossible to sell the whole of what could be produced at a remunerative price. The general knowledge of this fact prevents or retards the adoption of the technically best methods of production over large fields of industry. This radical difficulty of finding full, regular, and remunerative markets for the largest possible product, though most fully

realised in the advanced manufactures, extends in varying degrees of pressure throughout the whole area of modern industry, and more than any other cause abates the stimulus to apply the economies of production which science everywhere suggests. Even in agriculture no security exists that an increased output, due to improved methods of cultivation, will afford any corresponding benefit to the producers, or can even find a market which will cover costs of production.

The widespread knowledge of this economic weakness induces large bodies of organised wage-earners to adopt a more or less avowed and conscious policy of restricting the output of their labour-power. In every direction we find the full utilisation of scientific methods of production restrained by limits of market. Other immense wastes of industrial power are direct results of this tendency. One is the enormous and ever-increasing proportion of energy devoted to the competitive side of commerce, attested by the growth of agents and travellers, and by the multiplication of retail sellers out of all proportion to the growth of population. Another result, still more costly in its direct and indirect consequences, is the international hostility arising directly from the limitation of profitable markets for trade and for investments. Most modern wars are largely inspired by the growing strain of the competition for foreign markets, as outlets for an excess of products beyond the requirements of the home market, and the greater part of the expense of national armaments must

be credited to the same account. Here is the gravest practical issue of modern industrial development, the evident failure of the growth of consumption throughout the industrial world to keep pace with the possible growth of production, with the result that the most scientifically equipped businesses cannot exert continuously their full productive powers, that many scientific improvements cannot be adopted without long delay, and that large quantities of capital and labour remain unemployed or under-employed during a considerable portion of their productive life.

Put briefly, the problem is this: Why is it so much more difficult to sell than to buy, that producers for sale are continually obliged to check the producing power which they command? The solution of this problem belongs to economic science, and it is the backward development of that science and its sociological congeners that blocks the march of progress in the technical arts of industry.

While certain special departments of economic science, in particular certain periods of economic history and problems of finance, have made notable advance during recent years, we seem further removed from the possession of a unified body of economic doctrine, capable of explaining such economic waste and disorder as we have just described, than we were when J. S. Mill published his "Principles of Political Economy" in 1848. The truth is that further progress in objective economics was impossible until some definite

beginning had been made in social psychology, and in a nation where social science is still almost without meaning for the multitude, and is derided as a charlatan or pretender by most devotees of the physical sciences, social psychology is the least cultivated of all studies. Industrial power, as modern science exhibits it, cannot be properly utilised without human direction, and this direction depends not merely upon knowledge but upon motive. The waste of actual industrial power and the retardation of industrial progress, which are admitted facts, are principally due to an uneconomical direction of human motives. The nearest approach which current political economy makes towards a recognition of this vital truth is in some loose allusions to a "standard of comfort" conceived from the standpoint of the consumption of a single worker or a single family. Now until the central theme of economic science, Value, is resolved into its two sets of psychical determinants, subjective cost and subjective utility, and these treated in terms not merely of individual but of social psychology, an art of social control over the physics of industrial powers, so as to utilise these powers in the service of mankind, is impracticable. The slender, confused, and often fallacious reasoning, borrowed largely from German and Austrian sources, which in this country and America sometimes ranks as subjective political economy, has not advanced far enough to throw much light upon the reforms of economic structure which are essential in order to get for industry the full fruits of science.

This general criticism may sound vague. Let me give it clearer meaning by allusions to admitted wastes, which arise from weakness or misdirection of motive. Why do most workers fail to gain the full efficiency of which they are capable? Why do they habitually withhold a large amount of the productive energy they are capable of exerting upon the level of their actual efficiency? Why is there so much loss of energy from defective co-operation between the different workers and the different departments in most businesses? Why do employers expend so much brain-power and time in the organisation, not of production, but of competition? Why do they find it necessary to stop or slacken the producing-power of the capital and labour they have at their command? Every one of these wasteful actions implies a motive, and we can only understand or remedy these actions by analysis of these motives. Individual analysis will serve little: the workman who withholds his labour-power, the employer who slows down his mill, acts from a quite intelligible motive of self-interest, the knowledge of which does not carry us far towards the analysis we seek. The forces of human motive which are responsible for waste are social forces, not explained as a mere addition of individual motives, though they operate through individual wills; and they must be studied in their collective character as the psychical counterparts of the co-operation of physical forces, human and mechanical, which forms objective industry. The theory of objective

industry is, that it is a vast scheme of co-operation worked for the mutual benefit of all its members, which benefit is secured by specialisation of economic function and by exchange, competition in all its branches being merely one mode of co-operation. That this scheme works very wastefully is generally admitted, and this waste driven home implies that the wills of individual workers and of business groups in this great co-operative whole are weakened or prevented, so that the productive energy they inspire is deficient or misspent. This defect is of a twofold nature. In the first place, the stimulus of individual self-interest upon which the present business system formally relies, is wastefully applied through the existing distribution of wealth. Large portions of income which are paid in rents, high profits, fees, &c., though necessary payments in the sense that they can be extorted by advantageous bargaining under existing terms of ownership, afford no genuine incentive to the owner of any sort of productive energy to apply that energy, and, in not a few instances, serve to divert the use of land or capital from socially useful to socially useless, or even injurious applications.

Unearned or excessive elements of income not merely serve to evoke no productive energy, they serve to sterilise potential energy. This waste of excessive payments has for its natural counterpart a corresponding waste of defective payments. Under the systems of wage-labour which commonly prevail an inadequate stimulus is applied

to the will of individual labourers to evoke their best efficiency.

The extreme form of this injurious economy is known as "the sweating system"; here individual efficiency and progress is kept down to the lowest level. But the conditions of employment of most wage-labour are such as to offer no sufficient incentive to progressive efficiency of individual workmanship. Where the conditions of the labour market are such that wages are low, employment insecure, and the chance of personal advancement and success trivial, the productive energy of the people remains unrealised. Nor is this waste confined to wage-labour. The small manufacturer in staple industries, the small trader, and large sections of professional men and intellectual producers, are subjected to similar enervating disabilities.

Security of sufficient employment at fair remuneration, and of opportunity to rise by merit, are essentials of sound industry. For lack of this security industrial order is demoralised and industrial progress impeded. The waste of disorder represented in conflicts of capital and labour, unemployment, and the squandering of excessive energy in competitive commerce, great though it is, is insignificant as compared with the retardation of the pace of industrial progress by withholding the hope of an adequate reward of skill and invention from the vast majority of those engaged in industry.

But the stimulus of individual gain is an

unreliable psychic force in the orderly progressive working of the new industry. A development and fostering of the corporate spirit is needed to impart humanity into industry, and to restore that power of fellowship, which, present in the more primitive industries of the family, the village and the early city, has been lost in the transition period through which we have been passing. Not merely upon ethical or civic considerations, but upon economic, it is desirable to combine with the appeal to individual gain a wider appeal to the social nature. If all industry is in its actual concrete operation and its uses social, the energy which proceeds from individual producers serving general human ends, some direct conscious understanding of and sympathy with this social process must form an element in true psychical economy. As in olden days, guild-workers assuredly worked better because of the conscious fellowship, so in the larger and more complex industrial society of to-day, some growing sense of the social nature of work will help to draw out from the nature of the individual worker the better qualities of social service. This rationalisation and humanisation of industry should be the supreme work of the applied science of social economics. A wide field of observation and experiment in the stimulation of human motives is already open; the great expansion of public industrial enterprise in many departments of state or municipal products, the productive and distributive co-operative movements in Great Britain and the continent of

Europe, numerous experiments of communist societies, to say nothing of the various forms of profit-sharing and other schemes for stimulating individual and group energy practised by private business firms—all these phenomena present an inductive basis for a science of economic psychology serving an act of industrial progress.

The chief immediate objection of such an art would be to assist the organisation of businesses, trades, and inter-trade relations upon a basis of sound economy of motives for the individual and group activities of the participants. Which businesses are best undertaken by a state or a municipality, which are best left to private enterprise, which private businesses require state control, and the nature of such control; what are the relations between landowner and occupier, employer and labourer, undertaker and investor, retailer and consumer, and how the product can be best apportioned in different sorts of business so as to evoke and maintain the best co-operation of productive effort? how the volume of production can be kept full, regular, and progressive by securing these same qualities for the volume of consumption; such are some of the questions which await the reformation of an economic science based on a simultaneous and related study of the physical and psychical bases of industry.

SCIENCE AND ADMINISTRATION

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THE oldest demand for science in administration is Plato's nobly defiant claim that "until philosophers are kings, or the kings and princes of this world have the spirit and power of philosophy, and political greatness and wisdom meet in one, and those commoner natures who pursue either to the exclusion of the other are compelled to stand aside, cities will never have rest from their evils—no, nor the human race, as I believe."[1]

The paradox that society can only be regenerated as a result of that union of wisdom and power which would itself be the final achievement of a reformed human life, is less difficult in a Greek conception of society than in one in which the idea of democracy has become vital. But it conveys, in an undeveloped form, a truth which, long forgotten, has emerged from the political strife of centuries as an essential element in the idea of government.

Two great tendencies have led up to this result. After the long wars of contending dynasties, the

[1] Plato's "Republic," Jouste's translation, vol. iii. p. 170.

struggles between Church and State, the conflicts between ruling classes with their rival interests, the nations of Europe have arrived, or are in course of arriving, at the simple but neglected discovery that the prime function of a government is to secure the well-being of the people who live under it. They have sometimes learned this lesson in the school of turmoil, and sometimes in the quieter and more gradual course of political enfranchisement. But in the end it has become impossible to us—as in other times it has not been impossible—to think of any other object which a civilised government could justifiably prefer to the improvement of the life that is lived under its guidance by its people.

With the growth of this humanistic conception of government another tendency has co-operated. The area of scientific knowledge has widened and the ambitions of science have grown. Not only have the sciences from mathematics to biology, and the arts from mensuration to medicine, become more extended in their range and more definite in their use, but there has been a steady and rapid growth in the application of scientific methods to the study of human life itself—individual and social. Human society, in all its aspects, has become more and more a subject of scientific study; and the sciences and their corresponding arts are increasingly expected to contribute to social well-being.

The net result of these two tendencies is that government is more and more bound to make

itself scientific—to bring into the service of its departments the most expert scientific skill—to submit its proposals to the scrutiny of those who are best trained to estimate their real effect on the people who are concerned.

There is, indeed, one sense in which the Platonic demand that rulers should be philosophers does not go out of date. For Plato, the wisdom which philosophy seeks is something larger than the knowledge of causes and effects that constitutes positive science. It is also an insight into the purpose and meaning of things, which does not merely enable its possessor vaguely or clearly to foresee their consequences, but trains him also to grasp their ideal significance—to choose between objects of pursuit, and to protect himself from vulgar errors of judgment by principles of choice and action that are integral to his mind. However remote this may seem from the opportunism of what we call "politics," it is an attribute without which no one can be fully qualified to govern; and the degree in which any people can be well governed depends on the degree in which this instinctive wisdom is latent in whatever may be the really sovereign power, and developed in those who are the prime instruments of administration. There is no other protection than this against the inroads of private interest and the abandonment of the best ideals.

But the conditions of modern life demand more than this. The life of an industrial community must be scientific, because it must be organised.

When every other interest is provided for with calculated forethought and knowledge, it is not possible to leave that well-being which is the supreme interest of government to uncalculated chance and conjecture. The methods that are sufficient for a simpler existence are inadequate to the complexity of modern industrialism and its problems. A scientific scrutiny has become inevitable. When this is recognised, the problem of applying science to government becomes one of organisation. For a despotic government the question is of course an entirely simple one. The despot has no more to do than to choose his scientists and sign their decrees. But the problem of such a country as Great Britain—the problem of a government at once scientific and democratic—is quite a different affair.

Especially is this seen to be the case, when we consider that democratic government evidently and increasingly involves a great decentralisation of administrative work. Administration becomes always a greater factor in national life in this country. Legislative reform is, no doubt, a matter of constant demand and frequent occurrence. But the tendency of almost every great social reform is to take effect through an increased use of administrative machinery; and the necessity for popular supervision of administrative work raises at once the question of an adequate method of popular control. Apart from any wider proposals, which lie beyond the scope of this discussion, it is evident that the only possibility of such control

lies in the creation of local administrative bodies, charged with specific duties, and subject to popular approval as well as to the statutory control of the central government; and this is the solution which has been sought by the political instinct of the people of Great Britain.

It is not easy, however, to regard the present arrangement as the last word of scientific administration. It proceeds, no doubt, upon the sound general principle that questions involving local circumstances only are best left to the decision of local bodies; while the general principles of administrative action are properly determined by the central authority. But the meshes of such a principle are wide indeed; and it offers, in itself, no complete security either for the effectiveness of local popular control, or for the persistence, in local administration, of scientific principles of action. The responsibility of local administrative bodies is not sufficiently definite to secure the full benefit of their growing experience and of the development of public opinion; and, on the other hand, the central control under which they act is, on the whole, too much devised simply as a check on their action, and too little as a deliberate adaptation of means to ends towards which the efforts of local administration should be directed.

The work of remedying this twofold defect requires, on the one hand, a much fuller and more regular system of consultation between the central and local authorities; on the other hand, it requires a much greater degree of initiative in

the central government—an initiative which can never be expected from ordinary permanent officials, however admirable, but which must be given by the free play of scientific criticism, and suggestion on the work of administration in its largest and most general aspects.

For, in the end, it is to the central government that we must look for science in administration—for the deliberate selection of administrative objects and the adaptation of means to secure them.

But how is science to be imparted to administration by the central government?

We cannot seriously look to the politicians. Governments are not composed with an eye to the scientific attainments of their members. If we look back along the roll of British Prime Ministers, we shall not find one who could be said to have been chosen as the man in all the kingdom most able to calculate and provide for the general welfare of the people. A man does not become Prime Minister on such grounds as these. The task of forming a government falls to him perhaps because he is the fitting instrument of the nation's will in some enterprise on which its heart is set—an enterprise political, imperial, ecclesiastical perhaps, and wholly remote from all the administrative issues that determine the life of the people. He may be chosen even on less relevant grounds—because he excels in the gifts that make for Parliamentary success; because he has done great service to one of the parties in the State; or because he is the only man with

whom a certain number of distinguished and indispensable persons can be induced to associate themselves. As it is with the Prime Minister, so it is with his colleagues. Governments are formed by bringing together those who are sufficiently agreed as to special issues which for the time are of acute interest, who have skill in Parliamentary debate, who represent and conciliate important sections of public opinion. But their members, though they are expected to have the ability that will make them capable administrators, do not usually possess any high degree of knowledge of the subjects with which their departments have to deal.

To all this we must reconcile ourselves; and it is no less true of the Parliament to which governments are responsible. It is surely true of the House of Lords, and it is true of the House of Commons—that collection of business men and lawyers, country gentlemen, labour representatives, and unattached persons by which the business of the country is controlled. The mood of Parliament is as remote from science as its procedure is from celerity. Not that, for example, the House of Commons is indifferent to expert opinion. It is a body largely composed of men who are accustomed to rely on trained advisers; and nothing is more characteristic of it than its willingness to hear people on subjects which they understand. But it is in practice much more a medium for the criticism and accommodation of ideas than for their origination.

It is infinitely sensitive to the movements of public opinion; but it almost never initiates anything; and it does not even formulate ideas till they have long been the common property of educated people. Parliament is admirably fitted to acclimatise scientific conceptions to the administrative machinery, and to the common opinion and moral atmosphere of the country. But it is not an originative body; and it could not become so without ceasing to be the fitting instrument of popular government which, on the whole, it perhaps is, and which it increasingly tends to become.

The work of originating scientific proposals for reform, and of securing scientific criticism of institutions and policies, is left, on the whole, to voluntary effort. It cannot, indeed, be forgotten that among the permanent officials in the Government offices who form, in many respects, the most essential and valuable element in our machinery of government, there are many highly-qualified experts who are at the disposal of the ministers of the day, and who render them indispensable service. But their duty, speaking generally, is to supervise rather than to originate; and this is even more true of their general tendency and disposition. Their great function, indeed, is to be the depositaries of the tradition of government, and to maintain the efficiency of administration and the general continuity of policy through the changes of political atmosphere and the alternations of the political heads of departments. They

are, besides, fixedly departmental; and they maintain the rigid departmental boundaries, which are as essential to order as they are often inimical to progress. Their service to the State is incalculable; but it is not to them that we must look for a broad and fresh survey of national needs from the independent point of view of the scientific critic, or for the constructive guidance to statesmanship which only the free play of the best knowledge can give.

The choice lies, in fact, between trusting for this guidance to the voluntary and accidental contributions of scientific workers, and making some more systematic attempt to direct their energies towards the problems of national life, in organised efforts not confined within departmental boundaries on the one hand, nor, on the other, limited to mere routine varied by the incursions of political activity.

An instance of such an effort at organisation lies to our hand in the Committee of Imperial Defence, which plays an increasing part in relation to one of the great problems of our national and Imperial life.

This is a Committee which, without invading the departmental provinces that belong to the War Office and the Admiralty, devotes itself to the whole problem to which the work of both departments is ancillary. It surveys the situation, not from the point of view of departmental routine and administrative detail, but with a deliberate purpose of discovering what the defensive needs

of the country and the empire are, in order to impose upon the army and the navy definite duties and responsibilities, for which it then becomes the function of the respective departments of State to equip them. The result, if the work of the Committee be properly carried out, is a proper allocation of expenditure to the army and the navy, a definite scheme of action in which each shall play its part with due regard to the interests and the capacities of the other, and, through the co-ordination of the two services, a great increase in the real efficiency of both.

The Committee of Defence, no doubt, is, more or less, composed of members of the departments concerned, with the addition of certain political members of the Government; because the Committee deals with a matter in which, speaking generally, the experts are all in the service of the State. In other departments of administration this is not the case; and, so far, the Committee of Defence is an imperfect analogy.

Its essential character, however, is strictly relevant to the necessity for the organisation of free expert knowledge in order to determine the essential objects to which, in various relations, the work of government should be directed, and the functions which the various departments of State and local administrative bodies must be called upon to discharge. In each case what is required is a reliable body, not bound by purely official traditions, nor limited to the consideration of the work of one department of State, charged with

the duty of advising as to the ideals and the essential methods of administrative policy.

In the case of public health, for example, Local Authorities, the Education Department, the Board of Agriculture, the Home Office, the Local Government Board, have, all of them, responsibilities and functions. That their representatives confer is, no doubt, true; but from time to time chance reveals the failure of administration as a whole to avoid the departmental ruts. The accident of a Parliamentary inquiry discloses to the public the spectacle of physical deterioration in the people. We become aware that no one has been charged with the duty of discovering what the conditions of health are, and how the various departments ought to address themselves to the task of having those conditions secured.

So it is with education. We permit ourselves to entertain the extraordinary delusion that education is the exclusive business of the schoolmasters; and we entrust its guidance to schoolmasters, with a mixed control set over them locally and a department of magnified schoolmasters in authority. That is the inevitable structure of an education system; but it is a structure which needs to be kept under review and directed to specific objects. It is a structure involving local government, and requiring to be adapted to the task of preparing for the functions of a citizen—labour in trade and industry, war by sea and land—and to the equipment of a citizen with a sound and well-developed body, as well as an instructed mind.

Yet, although so many interests are concerned, education is the work of a department that is really a law to itself, coming under no regular and authorised scrutiny of those who are most competent to advise as to the objects which it ought to set before it, and the general conditions under which it may hope to succeed.

In the same way, we find many large interests of national life receiving administrative care only in so far as they may come accidentally, perhaps in some narrow aspect, within the scope of departmental action.

Such a problem as that of rural depopulation—a progressive tendency affecting the whole capacity of the nation—finds scarcely a place in administrative consideration.

The problem of the ineffective elements in the population fares no better. Every one knows that every large town or populous district contains a great number of people for whom no place can be found in the free life and stress of the industrial community. They are unemployable—perhaps drunken, perhaps partly criminal, perhaps merely parasitical. They paralyse the administration of the Poor Law; they disorder the life of the community; they constitute a grave burden on the effective labour with which they compete irregularly. The ordinary law provides no efficient way of dealing with them. In every crisis of unemployment their presence aggravates the difficulty, bewilders the efforts of beneficence or administrative provision, and makes a just estimate

of the facts impossible. Their existence in the ordinary life of the community is an unmixed calamity to themselves and to all their neighbours.

Yet it is not the duty of any one to know about this. The Local Government Board supervises the administration of the Poor Law. The Guardians or the Parish Councils carry it out. The police act when the circumstances call for them. Every one takes his part in the solemn farce, with a more or less complete sense of the inefficiency of what is being done.

A crisis and a Parliamentary difficulty bring about the appointment of a Royal Commission, and possibly some step forward may result. But what is required is not a Royal Commission to deal with this or that phase of the problem of poor relief or its substitutes. There cannot be really efficient administration to deal with the waste, if perhaps reclaimable, elements in the population, unless it be permanently the duty of some one to know the facts that need to be provided for, and to advise the means best fitted to deal with them; and this is no departmental task, because the wide scope of the problem really obliterates the departmental landmarks.

These are instances, which might easily be added to, of the necessity of a larger outlook on problems of domestic administration. It is only necessary to refer in a word to the fact that our problem is not merely national but Imperial also. If our national problems require constant consideration

by trained minds, neither trammelled by departmental habit and tradition nor immersed in political discussion, how much more is this the case with our vast over-sea problems, involving as they do the interests and the circumstances of great populations remote from our knowledge. A fresh eye on Imperial administration is a constant necessity—the advice and scrutiny of men who are fitted by scientific training to appreciate problems which often lie below that surface to which uninformed common-sense has access, and which cannot receive the completest treatment when they are left to be dealt with as matters of official routine.

If it be recognised that, in the growing complexity of life, administrative problems are less and less of the simple sort which can be adequately solved by rule of thumb, it is scarcely possible to argue that the provision of scientific guidance for administration can be safely left to the chance efforts of irresponsible private persons.

It must be the duty of chosen men to offer, and the duty of responsible ministers to consider, advice on the great topics of national and Imperial welfare. Responsibility for administrative action can never be removed from government, from Parliament, and from the nation itself; but to take, or to neglect, action, without the best counsel and consideration that can be found, is a responsibility that should be felt to be too great.

Wisdom is the beginning of efficiency. Science in its widest sense is essential to the commonwealth

—not only in its simple application to details of health, of industrial processes, of the arts of war and peace, but also as the guide of policy, the arbiter of principles that are to govern action. It may, indeed, be no easy task to carry out, through the machinery of representative government, and in the conflicts that make up the nation's public life, the policy that the highest wisdom dictates. But it is possible to make the voice of mature knowledge and scientific judgment more clearly heard in our councils. If it be heard, it will not be neglected wholly; "and then only will this our State have a possibility of life, and see the light of day."[1]

[1] Plato's "Republic," Jouste's translation, vol. iii. p. 171.

SCIENCE AND CITIZENSHIP

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I

AN eminent sociologist has recently spoken of the "bankruptcy of science as to any choice of ideals of life," and again we are told that "sociology no more than mechanics or chemistry has any policy." That doubtless is the prevalent view in these reactionary times, when apostasy from science is almost a fashion. The object of this paper is to maintain the contrary view. And although the logic of its argument may be open to revision, the moral principle from which it starts will not be gainsaid. That principle is embodied in the well-established maxim, "If a lion gets in your path, kick it." There are those who believe that the way out of the present tangle of sectionalisms is to be found, not by turning back, but by pressing on. If science cannot direct us, we must direct science. All life is growth, and science understood as a spiritual phase of racial life, a mood of humanity, may, like other spiritual growths, be trained and guided, within limits. Here as elsewhere the essential condition of

guidance is the presence of an ideal and a moral impulse toward it. It is the contention of this paper that the ideals of science, always implicit, are now actually in process of being explicitly formulated, and that these ideals give promise of a policy of city development. And once to see and feel this movement of science is to participate in it, to forward and direct it.

II

In a first rough approximation it may be taken that the middle term between Science and Policy is Potency. The conception of Potency presents itself to us with a reality and a force proportional to the frequency and intensity of our first-hand immediate and direct contacts with nature. The conception doubtless reaches a vanishing point in the minds of that urban breed of domesticated animals which are cut off from nature by continuous confinement in the cages called town houses; this variety of animal degenerates into a sort of subnatural species, with supernatural cravings. The city in its evolution is of course a natural phenomenon; but within the city, the barriers between man and nature are numerous and formidable. Amongst the dwellers in cities, it is probable that the only persons who are in habitual contact with nature are mothers and poets. To the mother the infant is an embodiment and epitome of all the potencies of nature. The baby, as has been well said, is a bundle of potencies.

Its development through adolescence to maturity is the realisation of its potency for evolution or for degeneration. The process of growth is, in the proper sense of the word, the education of the child, that is to say, the drawing out of its potencies. In its training and education the primary factors are three. These are the hereditary predispositions of the child, the resources available for its education, and finally, the ideals of the mother. It is the last which is perhaps the most important for the progress of culture, for of the three factors the ideal of the mother is the most variable, the most modifiable, and therefore the most subject to control and guidance. The mother's ideal is a compound of the types of humanity that have most appealed to her in actual life, in romance, and in history. In other words, it is, whether she knows it or not, the historical or racial imagination of the mother that determines her ideals. She directs the education of her child towards her personal ideals of strength, of health, and of wealth, towards her personal ideals of beauty in person, of wisdom in thought, of goodness in deed. And in proportion as these different aspects of the mother's ideal of manhood and womanhood harmonise into an imaginative unity, a synthetic reality, in that proportion she has an educational policy for her child. For a policy is but a name for a system of dealing with one's resources for a definite purpose. In short, a policy is a scheme for the development of potencies in the direction of an ideal realisation.

III

What is the relevance of all this for science? There are two dominant moods or manifestations of science: the cosmic, the naturalistic or geographical mood, on the one hand; and on the other, the humanist, the historical, the idealist mood. In the former, the cosmic mood, the scientist feels a relatively slight interest in the human race and its doings. There are so many more impressive phenomena in the field of observation! Are there not one hundred thousand species of beetles compared with a single species of man? The entomologist bulks larger in science than the sociologist, simply because the boy is father to the man. The scientist in his cosmic mood is a stereotyped, a perpetual boy. The curiosity of the boy about the wonders of nature ceases, from the moment when his collection of curiosities fills the last of his pockets. But the pockets of the scientist take the form of extensible museums; and hence the temptation to go on collecting, until the habit determines his life, and in course of time he finds himself unable to feel either the cosmic or the human emotion.

As the boy sometimes grows into the man, the cosmic scientist may grow into the humanist one. He no longer observes the phenomena of nature as a mere series of sequences and co-existences following each other in endless succession; he looks upon nature as a reservoir of resources for the use of man. He seeks out the potencies of

nature, foresees their possible developments, and conceives his ideals of human life in terms of the optimum expression of known potencies. In Bacon's phrase, man controls nature by obeying her. In this respect science is just the ordered and growing knowledge of the ways of nature leading to human evolution. Science, in its pure and applied forms, here stands for the collective resources of the race available for the maintenance and advancement of human life. Science is thus—in terms of the illustration used above—a sort of generalised mother of men, as it were, a race-mother. And if the policy and ideals of science for her children are slow of formulation, that is because of the slow evolution of science itself. Arrested at the cosmic stage of thought, the majority of scientists do not recapitulate, with sufficient completeness, the racial evolution of the group to which they belong. Such racial recapitulation is, as has been well said, nature's way of preparing for a fresh start. And unless, therefore, the individual scientist in his own personal development passes on from the cosmic, physical or naturalist phase to the humanist and idealist phase, he does not undergo the preparation necessary to enable him to contribute to the advancement of science in its proper historical evolution. In this arrested development of most individual scientists is doubtless to be found an explanation of the slow evolution of the humanist or sociologist sciences.

If we understand by spiritual power a set of

established beliefs, like Judaism, Mohammedanism, Romanism, that influence conduct and determine the mode of life, then we must say of science that it is an incipient rather than an actual spiritual power. In this sense there are sciences but no science. If we look round us amongst our contemporaries, we should most of us have to search far before finding an individual whose life and conduct are unified by science. Notable examples are, to be sure, numerous in history—such as Lavoisier and Condorcet, Helmholtz and Pasteur, Darwin and Clifford, and, if it is permissible to cite living scientists, Berthelot and Haeckel, Francis Galton and Karl Pearson. Similar though less notable contemporary instances are not common, though in all probability they are more numerous in the obscure annals of University and Academy, Museum and Library, than most of us imagine. There are many whose lives are unified by religion, still more by marriage, and not a few by Monte Carlo. But the truth is that as yet science has afforded no rounded doctrine of Humanity sufficiently simple and facile for the comprehension of the artisan, the rustic, and the cabinet minister. The difficulty of that achievement lies mainly in the natural history fact, that the scientific habit of mind in the observation of social phenomena, though it is universal amongst children, yet persists in few adults. It survives adolescence in a certain number of social investigators, like anthropologists, folklorists, economists, historians, psychologists, &c., most of whom are so highly specialised as to have

lost the instinctive desire for a general doctrine of social evolution. It survives also in a limited number of sociologists, many of whom are reluctant to be labelled with that title. Thus the dispersion and isolation of the sociologists, and the ignorance and unpopularity of the name, are due not so much to the hardness of the word, or the difficulty of the doctrine, as to the prevailing inability of the folk-mind to distinguish between sociology and socialism, between science and scepticism.

IV

Thus, owing mainly to the incompleteness and sterility of the social sciences, the unification of science is very far from being a visible reality, and consequently the influence of the scientific party is relatively slight in every country of the occidental world, and least important of all perhaps in Great Britain, with the possible exception of Spain and Venezuela. It is but the other day that the only high-level meteorological observatory of Great Britain was closed, and the staff dispersed, the records ignored even without examination, and the apparatus offered for public sale—all because the influence of the scientific party was not equal to securing for its support about £500 out of the one hundred and forty odd millions which constitute the annual national budget. In laudable over-estimate of the desire of other European Governments to possess meteorologists, the Government of the Argentine Republic cabled to secure the staff of the Ben

Nevis Observatory ; and as they were in this largely successful, it may be that what has been lost to the British Empire by this calamitous misadventure is to be preserved for science. A measure of the relative weight exercised in the councils of the nation by the scientific and militarist parties is seen in the annual grant made by the Central Government to the collective university chests of Great Britain and Ireland. This grant is about £100,000 per annum. That is about the sum expended in keeping in commission for a year a single first-class battleship. And if we add to this an allowance for depreciation and certain necessary incidental expenses, the annual cost of a first-class battleship would probably reach to three times the university grant, for a first-class battleship costs about a million sterling to build, and is not effective for much more than a decade ; and the addition of each one to the fleet necessitates for its full efficiency an increase of dockyard and harbour accommodation, the cost of which, if it were known, would probably be found to run into hundreds of thousands of pounds. A final illustration. An eminent astronomer who had spent a long life alternately in the observatory and as professor in the university class-rooms, recently retired. That his salary had been little more than the earnings of a successful artisan need be no ground of reproach to the good scientist ; but the rigid application of official regulations, framed for a somewhat dissimilar purpose, resulted in the allocation of a pension which was entirely insufficient to

provide for the few and simple wants of the aged astronomer in his retirement. Representations were made to the Central Government, and a complacent officialdom awarded an increase of the pension at the amount and rate of 2s. 6d. per week.

If we assume that at present there is no science, but sciences—unclassified and therefore ungeneralised, it would seem to follow that there is no scientific ideal, but only scientific ideals—unharmonised; and no scientific policy, but only scientific policies—un-co-ordinated. The scientific party, or what would be the scientific party if there was a common doctrine to give it cohesion, is broken up into disparate groups, most of which do not speak each other's language. For instance, the mathematician and the physiologist are separated from each other by a wide arc in the circle of the sciences; but they have this in common, that each holds it an article of faith that he would fall short of his scientific duty if he did not acquire the language of France, Germany, and Italy, as well as of England. But if it should happen that here and there a mathematician or physiologist takes the pains of learning the language of comparative ethics, folk-lore, economics, or any other sociological field, he will be held by his brother mathematicians and physiologists to be doing what is at best a work of supererogation, at worst an act of reprehensible wastefulness. To the scientist of the physical or biological group it appears as much and as little a matter of professional obligation to acquire the language of the sociological group as to acquire

that of the Hottentots. What then amid this apparent confusion and disruptiveness of science is the inquiring citizen to do if he wishes to know the bearing of science on citizenship? The answer of science, as of every other spiritual power, is that there is only one way to know the doctrine, and that is to lead the life.

V

The scientific quality of citizenship can only be apprehended through the scientific conception of the city. And the first question which science asks about the city is—What is it?

What is a City? Legal and political definitions we have, but seemingly no scientific ones as yet. Now legal and political definitions, whether of cities or other social phenomena, are, as it were, ready-made articles of common usage, alike popular and recondite. To the majority of scientists—that is to say, those arrested at the mechanical stage of scientific thought—such definitions are alternately meaningless mysteries to be scoffed at, or shibboleths naïvely adopted by these scientists themselves, whenever social action is unavoidable or social thought demanded. On the other hand, there is a small but ever-increasing number of scientists, who push on through the world of form with which the mathematical sciences deal, onwards through the world of matter with which the physical sciences deal, and thence through the world of organic life with which the biological

sciences deal, and finally attempt to explore in a scientific spirit and with scientific methods the world of mind and society with which the psychological and social sciences deal. And this, as already stated, is the normal progress of the mind. We see it exemplified by most of the great leaders. We see it, for instance, in Helmholtz, who began his career as a mathematician, passed through that to physiology, whence it was but a single step into psychology, and in the later period of his life he interested himself most in education and social questions. The same tendency is seen in Darwin's transition from the "Origin of Species" to the "Descent of Man." We have been told that the sociologist is an individual who has failed to make a career in one of the preliminary sciences, just as, according to Disraeli, the critic is a person who has failed in literature. In point of fact this doubtless is often true; but the contrary proposition still more widely holds, that the successful mathematician, physicist, or naturalist, is an arrested sociologist.

Returning to the question of legal and political definitions, we have to note that these, are to the psychologist and sociologist an essential part of the raw material upon which he has to work. They are points of departure in his observations, and often supply valuable clues in his researches. What definitions of the City are available for the purpose? They differ, of course, from country to country, but whether propounded by a lawyer, by a politician, or by the man in the street, they

belong, in the eyes of the comparative psychologist, to the folklore of the country. In short, they are pre-scientific. In England, the legal definition of a City is, as every one knows, a place which is or has been the seat of a bishopric. In other words, a City is essentially a cathedral city. To this we must return later, merely noting it now as for the sociologist a great "pointer fact," in the phrase of Tylor. In the United States of America, the conception of a City is, in appearance at least, of a more material kind. In that country there is no lack of resources of observation, for it is a place where a crop of new cities is grown annually. The process of city making may be seen as a matter of almost daily observation in new and rapidly developing states of the Union, like Oklahoma and Alaska.

VI

There is perhaps no more representative type of American civilisation, and also, therefore, of the dominant phase of the contemporary western world, than the American railway engineer. He is the true Viking of the times, and is already on the way to plant his forges, and open his lines of communication all round the margin of the Pacific Ocean. What is the conception of a city in the mind of the American engineer? Direct items of evidence may be gathered from almost any of the innumerable reports on new railway enterprises, which are common documents, not

only in the great cities of America, but also in the capitals of Western Europe. The following extract is taken from a typical document of this sort. An eminent engineer is reporting on a proposed railway from Oklahoma into Indian territory. He surveys and records centres of population, actual, incipient, or prospective, along the route of the projected line, taking one centre after another in the following fashion :—

"CHICKASA is the recording-town of the Nineteenth District. Population claimed, 8000. The town site has an area of 124,619 acres, and is located in the valley of the Washita river, surrounded by rich farming lands, where corn, wheat, oats, rye, potatoes, and all kinds of vegetables, fruit, and berries grow in abundance. Horses, mules, and cattle are raised.

"It is an incorporated city with a city government, and is the recognised jobbing centre of the south-western section. Contains among other the following industries :—

Chickasa Cotton Oil Co., capacity 120 tons per day.
Chickasa Milling Co., capacity 800 barrels of flour per day ; two elevators, capacity 100,000 bushels.
Chickasa Iron Works.
Choctaw Mill and Elevator Co.
Traders Compress Co. (about 30,000 bales).
Electric planing mill.
Steam brick plant.
Wholesale grocery, hardware, furniture, saddlery and harness stores, and general merchandising.

"The city is provided with electric light plant, ice plant, two telephone exchanges, water-works and sewerage, gas plant (under construction)."

It will be noticed that this engineering conception of a city does not envisage a single culture

institute — not even a church or public-house. This, however, is an omission rectified in a document issued by the Seward Chamber of Commerce in August 1905, descriptive of the growing towns and cities of Alaska. Of Seward itself the document says: "Although but one year old, it contains general stores of every kind, hotels, ten saloons, a bank capitalised at 50,000 dols., a daily newspaper, four churches, a flourishing public school, an electric light plant, and a telephone exchange." Of a place called Fairbanks we are told that: "The city had a population of 7500 on 1st July 1905, and was equipped with every modern convenience, such as telephone, electric light, water-works, churches, public schools, and a daily paper receiving a full telegraphic report of the world's news." It is clear that what the American railway reformer understands by a city is not a city at all, but a Town—*i.e.* in the admirably correct and concrete phraseology cited, it is a "jobbing centre." To the list of the urban "conveniences," the Chamber of Commerce standard adds, churches, schools, newspapers, and saloons. And the progress in civic ideals is signal. For churches, schools, newspapers and saloons are institutes of culture; and are seen to be the lower institutes of culture only when contrasted with Cathedral and University, with Scientific Society and Art Museum as higher ones.

Science in Public Affairs

VII

A visitor to any of the goods stations of the railways running into London from the north, will see any day of the year, but more particularly in the autumn, vast numbers of coal-laden trucks awaiting delivery. It may be said of at least two of the northern railway systems, that they exist for the purpose of carrying coal to London. The traveller who is carried, in about two hours, from St. Pancras to Nottingham in a luxurious restaurant car may imagine that the Midland Railway is designed and administered for his benefit and comfort. But that is an illusion of the unreflecting citizen. The truth is, that the luxurious restaurant car is itself a bye-product of the coal traffic. In the eyes of the representative railway engineer the cities of England are, primarily just the terminal yards of the collieries; and the citizens themselves, according to his ethical scheme, rank in status and civic worth in proportion to the capacity of their respective factory furnaces. With literal and historical accuracy, the typical railway engineer sees the modern locomotive as just an elaborated pit pump-engine placed on wheels, and engaged all day in hauling coal-laden trollies from the pit mouth to the cities, and all night in hauling them back empty. To the railway engineer, science is a means of transmuting the energy of coal into cities and citizens. It follows that his policy of city development—or, as one should rather say, urban expansion—leans to the erection and multiplication of lofty

chimney stacks. The ideal citizens, pictured in the carbonaceous logic of his occupation, are stokers and chimney-sweeps. It requires little observation and less historic insight to verify the affirmation, that urban expansion in the nineteenth century was largely determined by the unavowed but real ideals of a coal civilisation.

The archæologists who are so industriously deciphering the buried histories of cities, have found the accumulated survivals of seventeen different cities in Rome. And so for other historic cities, the successive phases of city formations are marked by layers of superimposed débris like geological strata, with which indeed they are in direct continuity. Each successive civic formation is characterised by the impressions and the marks of its contemporary inhabitants, which survive in material structures like so many sociological fossils. Looked at from this point of view, the coal-laden trucks and the factory chimney stack with all their associated structures, economic and æsthetic, are actual or incipient sociological fossils of the coal cities of the nineteenth century.

To the dwellers in these coal towns—for cities in the proper sense they most of them are not—science presents itself as a kind of inverted philosopher's stone. The accumulated applications of science in the coal civilisations did not end with the production of gold, but rather began with it, more particularly that in Australia and California about mid-century. Given a possession or control of sufficient quantity of the precious metal, the

citizen found himself able to initiate a cycle of transmutations, and to carry it on up to a certain point, after which it appeared that the cycle completed itself automatically. This sort of scientific magic transformed coal into power to make cheap goods for the consumption of cheap labourers, and the cheap labour then applied itself to coal to produce more power to make more cheap goods for the consumption of still cheaper labourers, and so on indefinitely. This ever-extending series of transformations evidently reaches its culmination in the growth of an ideal city like East London, which so magnificently surpasses all other cities in its accumulated reservoir of cheap labour. Such are the ideals of civic policy which tend to work themselves out in fact and history, if not in word and theory, when city development gets arrested at the stage of Town.

VIII

Unfair as it would be to English, not less would it be to American civilisation as a whole, to impute to it the conception of civic status restricted to the limitations of the railway engineer or even of the Chamber of Commerce. The United States is not only the country of railway cities and railway kings, it is also the country par excellence, of schools, universities, and educationists. The American "School-ma'rm" balances the American Viking, and the world trembles in the hope and expectation that some day she may succeed in

taming and domesticating him. In no other way, probably, can his disforestings and devastations be effectually stopped, and his destructive energies converted to more constructive ideals.

If we define a university as a degree-granting institution, then there are over 700 universities in the United States of America. It is the aspiration of every American city to possess its own university. The university is, in a sense, the cathedral —a somewhat truncated one doubtless—of the American city, and every citizen is unhappy until his city gets what he conceives to be its full complement of culture, in the possession of a university. Here as elsewhere the principle holds—*cujus regio, ejus religio*—and we may agree with Herder's saying, "that the school is the workshop of the spirit of God," provided we are allowed the proviso of defining the divine artificer as the God of that region. Minerva is building again her temples over the land, and nowhere more assiduously than in the United States.

These 700 to 800 American universities are, it is true, reduced to more modest dimensions in the impartial list of the Minerva Jahrbuch. The German compilers of this annual census of the academic world admit only 70 universities in the United States. This number compares with a list of 21 universities in Germany, 16 in France, 18 in Great Britain, 78 in the rest of Europe, and for the whole world 236.

How far may we accept a certain vague popular sentiment which attributes city rank to a town that

possesses a university? That, to be sure, would be a criterion of civic status unrecognised by, and unknown to, the lawyer and the politician. But universities are not institutions that appeal to juristic and political minds. In Russia, the state corrects academic exuberance by occasional application of the military musket and the police baton; in India by proscribing progressive literature; in England by the more subtle processes of financial starvation. There is in the normal undergraduate mind a youthful ardour that is highly resistant to the juristic ideals which lawyers and politicians call stability, and physiologists call ossification. Is, then, this popular conception of the vital civic importance of the university a useful starting-point for the sociological investigator? In any case, it is a well-recognised truth that popular conceptions are, for science, more convenient points of departure than culture ones, since they are nearer to that naked and unadorned order of nature, to which the scientist must constantly return for the verification of his thought.

IX

Assuming, then, as a provisional criterion, the possession of a university as a determinant of civic status, we have in the university cities of the world two hundred and thirty-six objects which actually exist in time and space. Here is an abundance of concrete objects for observation, without which the scientific investigator, whether of cities or other phenomena, cannot get to work at all. His methods,

as he is apt somewhat wearisomely to remind us, are those of observation and classification, by comparison, generalisation, prediction, and verification by return to the concrete. To put it most briefly, the method of science differs from the method of other orders of thought in the necessity for arranging the various stages of investigation in such a way that two possibilities are always open. In the first place, it must be possible for every member of the scientific fraternity, present and future, to retrace and repeat every vital step in any and every investigation, from simple concrete observation right up to the largest generalisation. In the second place, it must be possible to return from the largest generalisation or the loftiest aspiration back to the concrete facts of nature, by a continuous series of steps, by an unbroken chain of evidence. This is the sacred Way of science. In most, if not all, the great religions of the East a peculiar sanctity attaches to the conception of the "way." That a mystic flavour should cling to Methodology will not therefore be surprising to those who hold that science is a culture-form of natural religion.

X

Having provisionally agreed upon our scientific criterion, we have two hundred and thirty-six definitive objects that exist in space and time under the designation of "City." From this proposition it follows that adequate precautions being taken cities can be seen. It is true that to see even a single

city is a feat which few of us ever achieve. Few of us ever succeed in seeing even our own city, let alone others. Hence the widespread illusion that cities consist of shops, factories and dwellings, with public-houses at the corners—these being the objects presented to the eye, as one passes along the open tunnels called streets. But there are certain animals, like birds, butterflies, and some human beings, that have the habit of viewing terrestrial objects from a height. And it is obvious that it is in vertical perspective only that a city can be visualised. The habit of viewing objects, both terrestrial and celestial, from a height was apparently a much commoner habit among the human species in former than in present times. Otherwise, how explain the wide occurrence of special facilities for the purpose? The mounds, the pyramids, the towers of many kinds which past civilisations have erected in such abundance, have doubtless various origins. But when facilities occur, as they generally do, for reaching the summits and thence making observations, we are bound to infer that we are dealing with real observatories deliberately planned for that purpose, whatever other purposes, religious, ceremonial, commemorative, æsthetic, these constructions may also have served. Our recent and contemporary civilisations continue to adorn or supplement our buildings with towers as inevitable, and, one is inclined to say, as automatically as the beavers build their dams and the bees their hives. But more often than not, we do not provide a stairway to the summit; or if we add that, how seldom

are facilities provided for observation from the summit. Even to the old church and castle towers that survive with their stairway and their observing platform, access is generally made difficult or impossible to obtain. We lock them up, and if that does not guard them against the curiosity of the citizen and tourist, there are other well-known modes of generating indifference. There is the custom of charging an entrance fee, which represents a considerable slice out of the worker's day. And if all these precautions fail, there is the final and frequent resource of losing the key. Assuredly the gods first blind those whom they wish to destroy.

The Imperial Institute in London, which commemorates the Jubilee of Queen Victoria, is adorned with a handsome and commodious tower of many storeys. In each storey there is a large chamber. A visitor in the early days of the Institute asked permission to enter and ascend the tower. The officer in charge was complaisant, and offered to conduct the visitor over the tower; but the key could not be found, and the visitor said he would return another day. On his next visit he was told that the key had been found, but it was not considered advisable to use it, for the structure of the tower was defective! Is any further explanation needed of the admitted failure of the Institute in the first decade of its existence? Happily, it has now been reorganised, and entered on a more useful phase.

XI

In order to see our cities as they really are, we must first of all see them in geographical perspective; and in order to do this we must recover the use of existing towers. We must also begin building new ones, designed and equipped to aid us in seeing with the eye of the geographer. In the scientific vision the first element is the vision of the geographer; or, putting it in another way, in the complex chord which we call science the first note is a geographical one. This vision of the geographer, what is it? Whence comes it? How may we ordinary citizens acquire it? What use would it be to us if we did acquire it?

Our school initiation into geography acquaints us with a certain scheme of form and colour symbolism which we call a map. The impression which intimate familiarity with the maps of our childhood leaves on the mind is apt to be a picture of the country called France, which is little more than an octagonal red patch, of Spain a square brown patch, of Scandinavia an oblong green patch, of the Rhine a blue line running from a dark patch called Switzerland, to a blue patch called the German Ocean. The experience of reading, observation, and travel doubtless supplements and corrects these crude pictorial impressions; and, in proportion to the fulness of such later experience, we approximate more nearly to the vision of the geographer, who sees our globe as it really is, has been, and is becoming, in space

and time. The geographer sees the land in its varying relief from sea-shore, over plain and plateau, valley and height, up to mountain summit. He sees below the surface of the waters, noting the shape and level of river-bed, of lake and sea bottom. He sees the crust of the earth everywhere in section, from the lowest and oldest rocks up through the superimposed geological strata, to the superficial deposits which wind and rain, storm and sunshine, snow and frost, disintegrate for the making of soil, on which the flora of the world fix themselves and feed, region by region, and across which the fauna of the world move and make their tiny marks and scratches. He sees the surface of the globe changing from day to day, season to season, age to age, epoch to epoch. And these changes he sees to be brought about in part by the place of the globe in space, and its relation to other celestial bodies, and in part by the very shape, form, and character of the surface and configurations themselves. Thus to the geographer the phantasmagoria of visible things presents itself as a drama, a great cosmic drama in which the part allotted to the human species is both insignificant and predetermined in all essential respects. The operations of man on the planet are, from this point of view, limited and conditioned by inexorable cosmic forces. The roads and railways, by which man connects his cities, are seen to be the merest scratches on the surface of the globe, wholly comparable in their insignificance to the tracks which the elephants

make through the forest, or the buffalo across the prairie. The cities themselves are but temporary encampments of herding groups of animals, determined or conditioned by such natural features as a river or a plain, an estuary or a mountain, a coal-bed or a forest. How relatively slight a geographical disturbance is made by the building of a city—even a modern capital city—may be realised by recalling, that practically the whole of the new town of Edinburgh is built out of a local sandstone quarry, so small that its floor would not afford camping space to a travelling circus.

XII

The foregoing account is intended to suggest the geographer's vision as it is in his naturalist or cosmic mood. But the geographer is himself a man and a citizen, and as geographer he still has his humanist or idealist mood. Viewed in his humanist or idealist mood, the world drama undergoes for the geographer a profound change. The perspective changes from the cosmic to the human focus. The typical river valley, which is the essential regional unit of the geographer, is no longer a mere fold of the earth's crust in its endless and aimless cycle of changes, but is conceived as the realisation of a great purpose. The long geological history of the river valley is seen as the preliminary preparation to fit it to be the scene of the exploits and aspirations of a godlike race of beings, such as is suggested and foreshadowed

by the noblest type of the human species. The designing and the making of a suitable theatre on which the human play may develop is a thought which gives a new orientation to the geographical conception of the river valley. Now the soil and the vegetation which cover its floor, the beds of coal, iron, sand, and limestone which underlie its surface, the forests which clothe its slopes and shelter its animal world, the metalliferous deposits of its mountain sides, the river which from source to sea invites to locomotion, all these are seen to be but energies and instruments awaiting for their orchestration the tuning hand and the idealising mind of man. And the city—the city which embanks and strides the river, which stretches across the plain and juts into the ocean, which ascends the hill slopes or penetrates the mountains—what is the part and place of this city in the vision of the humanist geographer?

When we think of the river valley as the regional unit of geographical science, we have to remember that it is like the ovum of biology—a developing unit containing the potency of a great realisation. What to the geographer in his humanist mood is the city but the effort of this regional unit to realise its own potency for evolution. City development is thus for the geographer no isolated phenomenon, but a normal stage—the culminating one—in a long sequence of events and processes. It is the ceaselessly renewed attempt to make for each region, here and now, its own Eden—its own Utopia.

Science in Public Affairs

XIII

It may be taken as a postulate of social geography that every region contains the potency of a city or cities, which shall be for that region, here and now, its heaven or its hell. And in the complexity of causes that lead to evolution towards the ideal city or towards its negation, there is a geographical factor awaiting discernment, analysis, comparison with the other factors, and re-synthesis into a synthetic conception. The traditional Civitas, the Urbs Solis, and other similar Utopist visions, have thus their necessary geographical aspect, unless they are to be completely divorced from reality. To the traveller (who is, of course, an incipient geographer) one aspect at least of the geographical factor is necessarily known. The hard experience of the desert is, to the traveller, a geographical prerequisite of the good time that awaits him in Damascus ; and, if dispensing with the geographical prerequisite, he attempts to make his Damascus a perpetual Elysium, what happens ? He is not long in discovering the reality of the phenomenon known in archaic phrase as the Fall, and he quickly discovers a vital connection between geography and theology. Geography, indeed, like every other science, has its element to contribute to the reinterpretation and revitalising of religious phenomena. If it may be allowed to a modest geographer to revise the judgment of so great a theologian as St. Augustine, it would be to point out the tenuity of his geographical

experience. Had St. Augustine been more of a traveller, he would doubtless have avoided the geographico-historical blunder of believing that it is predetermined once for all which are the cities of God and which are the cities of Satan. One of the truths revealed to us by social geography is that every city is engaged from moment to moment, from day to day, in determining for itself how far and to what extent, here and now, it is, and will become, a city of God, and how far it is, here and now, and will become, a city of Satan. In other words, predestination is a recurring and not a stationary phenomenon.

XIV

It may be objected by some traitorous professors of the science that the humanist note has extremely little part and place in geography, and the idealist one none at all. But it is always open to us to choose our standards of geography from the great founders of the science rather than from the bookworms parasitic on Petermann's *Mitteilungen*. And in any case, to the determinist geographer, whose scepticism refuses to see the idealist side of the shield, we may reply in the words of Turner to the critic who protested that he could see nothing in Nature like one of the artist's pictures, "Don't you wish you could?" The father of history, Herodotus himself, in passing to humanist studies by way of geography, made a step which, in the normal growth of the geographical

mind, does not stop short of the loftiest social and civic idealism. This tendency is abundantly illustrated in the lives of the great founders of modern geography. It is seen in Alexander von Humboldt, who continued and completed his geographical career as counsellor of state and coadjutor with his more humanist brother, Wilhelm, in the organisation of educational institutions. It is seen in Karl Ritter, who, as he progressed in the writing of his great work, was driven more and more to an emphasis of the historical factor. But it is seen most of all in the life and work of Elisée Reclus, whose recent loss we deplore, and whose place in the history of the science it is too soon to estimate, but there are those who believe it will be a culminating one. The eighteen massive volumes of his *Géographie Universelle* were but the preliminary training and preparation for his *magnum opus*, his "Social Geography," happily completed before his death, though as yet unpublished. But the general character of the work may be foretold by those who were familiar with his riper thoughts. It is safe to assert that his "Social Geography" will, more fully than ever before, demonstrate the continuity and correlation between, on the one hand, the destructive action of man on the surface of the planet, and on the other, the historical and the contemporary facts of human degeneration and civic degradation. But it will also, unless the work belies the character of its author, demonstrate also with unique experience and conviction a continuity of

ascent from geographical science to the loftiest aspirations of social idealism.

XV

The geographer's vision of the city, as the realisation of regional potency, is a faculty not of the professed scientists only. It is possessed also in varying degrees of fulness and clearness by every wise and active citizen, or at least by every citizen not altogether dehumanised by the machinery of education and affairs, or as Mr. Wells says, "birched into scholarship and sterility." It was the geographer's vision that prompted the city fathers of Glasgow to transform the shallow estuary of the Clyde into one of the great highways of world commerce. It was the absence of the geographer's vision that prompted Philip II. of Spain to cut off the national capital from access to the sea by removing it to the arid central plateau. It has been the geographer's vision which has inspired so many German municipalities to purchase and allocate to the common weal large tracts of suburban territory. And wanting the geographer's vision, our own municipalities have too often allowed the immediate environs of our cities to become the prey of the jerry builder and the land speculator. These are obvious and conspicuous examples. But the influence of geographical foresight, or its absence, is to be traced into every ramification of civic policy, into every department of civic activity. To draw upon the resources of

geographical science for the construction and criticism of civic policy is a manifest obligation, or, as it ought to be, a privilege and pleasure of the city fathers who are immediately responsible for civic policy, and of the body of citizens who are mediately responsible for the same. But are there not also whole bodies of the citizens into whose occupation and livelihood the application of geographical knowledge so largely enters that they might almost be called applied geographers? Is this not true of all those classes engaged in the organisation of facilities for travel and communication from the railway manager to the station porter, from the pilot to the bargeman, from the hotel-keeper to the cabman, from the road-surveyor to the crossing-sweeper? And in less degree is it not true likewise of the whole trading class, whose business consists in shifting goods from the place of growth and production to their destination in the hands of consumers? For all these, from the city father to the crossing-sweeper, the question is—Does each one utilise, to the fullest, such resources as contemporary geographical science can and should supply? The President of the Royal Geographical Society is the servant of the crossing-sweeper who has the knowledge and the imagination to use him.

XVI

What are the resources of geographical science? Where are they to be found? How may the

inquiring citizen utilise them? How may the crossing-sweeper utilise the President of the Royal Geographical Society? If the inquiring citizen was fortunate enough in his youth to commence a career of travel and exploration, by frequent truancy from school, then, doubtless, he acquired habits of observation which later on became disciplined into a scientific temperament. Doubtless in that happy case he is thoroughly familiar with the resources of geography. But most of us grew up into respectable citizens uninspired by that fear of the school-master which is the beginning of science. And if we have our scientific education still in front of us, we cannot do better than begin it by buying a copy of the admirable annual called the *Science Year-book*, issued by Messrs. King, Sell and Olding, of Chancery Lane.

Of the seven or eight sections in which the contents of this publication are divided, there is one called "Scientific and Technical Institutions." A first glance at the contents of this section might lead one to suppose that the book is of a humorous and satirical kind, for its list of scientific and technical institutions begins with an enumeration of "Government Offices." Saving this lapse, the book is to be taken as a serious manual. It enumerates and briefly indicates the functions of ninety-nine organisations in Great Britain called "Scientific and Learned Societies." These include small new groups such as the thirty oceanographers who constitute the Challenger Society, and meet once a quarter in the rooms of the Royal Society

in London, and periodically issue a series of oceanographic charts. Amongst the purely scientific societies, that which attains to the largest membership is the Royal Geographical, with its 4180 members. The functional activities of the Geographical Society are described as follows in the *Science Year-book* :—

I. MEETINGS.—Weekly, November–June, evening. Anniversary, 4th Monday in May.

II. PUBLICATIONS.—The *Geographical Journal;* monthly. *Year-book* and *Record;* and various special publications.

III. MISCELLANEOUS.—Medals: Two Royal Gold Medals, the Founder's and the Patron's, awarded annually; and the Victoria Medal at intervals. Money grants are also made from trust funds. A fine library of upwards of 37,000 books and pamphlets is maintained, and a map-room. The latter receives a Government grant of £500 per annum, on condition that the public shall have access to the collection.

Now the monthly *Geographical Journal*, the chief organ of the society, is an invaluable publication, but the only person who, in all probability, reads it through is its own editor, and that is as it should be. Life is too short to read the *Journal* of the Geographical or any other scientific society. But what every one should do is to utilise the spiritual organisation whose visible organs are the whole series of scientific periodicals. To do this we must know how to consult the files of these periodicals; in other words, how to put and answer questions through their pages. All these learned periodicals would be more popular were the common and obvious fact known to editors and proprietors of newspapers—as conceivably some day it may be—

that the most abstruse and recondite of scientific journals is nothing but a variety of the familiar publication known as *Notes and Queries* in its higher form, and in its lower forms, *Tit-Bits* and *Answers*. It would indeed introduce an agreeable and useful uniformity in periodical nomenclature if there could be one generic name with adjectival differentiations, such, for instance, as the *Zeitschrift für Socialwissenschaft* calling itself *Social Notes and Queries*, and the *Archiv für Rassen und Gesellschafts biologie* calling itself *Race Notes and Queries*, and so forth. That the analogy between the popular and scientific variety is real and not fanciful will further be recognised when it is observed that what are called conundrums and solutions in the one, are called memoirs and hypotheses in the other. And moreover the successful contributors are, it will be seen by reference to the above description of the Royal Geographical Society, rewarded, if not by participation in a guinea prize, yet by one or other of "the two Royal Gold Medals which are awarded annually," and "the Victoria Medals which are awarded at intervals."

XVII

The *Journal* of the Royal Geographical Society consists of two parts. There is in each month's *Journal* a bundle of maps and a budget of letterpress. In order to utilise the resources of the society, which functions through its *Journal* and

other publications, one must learn the interpretation of the symbolism and notation of the maps, and one must acquire familiarity with the few technical formulæ which occasionally break through the ordinary and simple language of its letterpress. There are simple, easy, and pleasant ways of achieving both these ends—in fact, short-cuts by which one may penetrate right into the heart of geographical science. To master the symbolism and notation of cartography, all one has to do is to compare the best contour maps (that is to say, those of the Ordnance Survey) with what one sees with naked eye, with field-glass, or with telescope, when one ascends the high points of vantage in one's own region. These high points of vantage are, of course, for the towns and cities, their towers, such as they may be; and for the surrounding country, whatever mound, hill-top, or mountain summit one's excursions and explorations may discover. The primary problem of the cartographer is to show by symbolic notation on a flat surface all the varying heights and shapes assumed by, or imposed upon, the earth's surface, above or below sea-level. What the ideal geographer, as cartographer, first of all tries to do is to devise a notation by which he and his fellow-geographers, by the inspection of a map of a given region, may get a simultaneous vision of the terrestrial phenomena which all the explorers and observers of that region have collectively seen. Now it must always be that however minutely observed and explored a region—even the most

inhabited—may be, there is always something new to be observed, even in the shape and configuration of the surface, for these are always changing; while the things and events, natural and human, which are continuously happening (for these also have to be mapped down), open up an endless vista for the future development of cartographic science. Hence there is no more easy and natural individual progress than for the school-boy beginner to pass onwards from simple observation of recorded phenomena to discovery of new ones. Once begin in the right way and acquire—which is so easily done—the right habits, and then the position of discoverer, will be reached by a normal and natural, an insensible and inevitable growth. As elsewhere, it is the first step which costs, and here it costs two shillings—that being the price of a "Bartholomew" pocket tourist map for your own region. It will be on a scale of 2 miles to the inch, if you are fortunate enough to be a Scotsman, and 4 miles to the inch if you happen to have the disadvantage of living in England. These maps you carry with you on your walks, your bicycle rides, your river excursions; and when you get back to the town or city of your region, you go to the Public Library where the largest ordnance maps are kept, and you observe how the things you have seen are noted or are not noted on these ordnance maps. And if they are not noted, there and then you begin your apprenticeship in scientific research in seeking out other maps which record different

varieties of regional phenomena; for example, the kind, the quantity, and distribution of its fauna and flora, its rainfall and its sunshine, the statistics of its population, its routes and communications, and so forth indefinitely. The problems which the young geographer finds in front of him grow rapidly in number and complexity, but his interest in facing, in investigating, and in solving them will be found to grow still faster. The explorations in the open air, alternating with research in library and study and map-room, will very soon whet an insatiable appetite for an understanding of the ever-changing phenomena of his region. The pleasures of observation, which, unlike other sensual pleasures, do not pall with usage, are themselves succeeded by the still keener pleasure and intenser joy of generalisation and interpretation. In brief, the outlook on the visible phenomena of one's region itself evokes and inspires a craving for insight into the larger world into which our own region extends on all sides by insensible gradation, and to which it is felt to be linked by innumerable bonds. It is just here, where the margin of his own region melts into that of the surrounding world, that the student requires and may readily utilise, the full resources of the whole science of geography. His previous reading will have been of the best geological and geographical accounts of his own region, and the comparison of these with what he has seen with his own eyes. This preliminary study will have insensibly familiarised him with the technical phrases and formulæ which

are necessary for getting into touch with his brother geographers elsewhere throughout the world, and utilising the observations, the thought, the interpretation of these, as well as the accumulated writings of their forerunners in the concerted effort of the whole past and present race of geographers, to visualise and to understand what passes on the surface of the globe.

XVIII

To realise the magnitude of what might be called the geographical group in Britain, we must add to the 4170 members of the society located in London the members of various local societies, such as those in Manchester and Liverpool, and also the considerable number of unattached mapmakers and geographical observers and writers. And, again, to these have to be added the corresponding group in Scotland, of which the Royal Scottish Geographical Society is the nucleus, with its 1100 members, its monthly journal and other publications, issued from its headquarters in Edinburgh, there being associated societies in Glasgow, Aberdeen, and Dundee. And, furthermore, every capital in Europe and many of the larger of the provincial towns contain similar groups of professed geographers with similar organisations, journals, and other publications. The New World also has its geographical societies, and with the formation of one in Japan they are penetrating the Orient. Here, then, is no national or even international, but a

world phenomenon, a universal brotherhood. It is a real fraternity in which the individual members and the several groups are linked together by a highly-organised system of inter-communications, by common aims and purposes, by a common method of thought and observation, by a common symbolism and system of formulæ, by common beliefs about the world and men's place therein. To imagine the resources of geographical science we must think not only of its accumulated documents, instruments, and aptitudes, but also in a still higher degree of the spiritual forces that pervade and animate this universal organisation, this world-extensive community of similar minds. And any one who is learned enough to master the symbolism of geography, to consult the files of the periodical publications is, if not a full brother, yet a novitiate of this universal fraternity. And to be a member of this community, what does it mean? It means much or little in proportion to the impulse and knowledge to utilise the collective resources of the community.

XIX

It is the boast—and a real and justifiable boast—of the Catholic Church that its Pope is a servant of every member of the Church down to the most insignificant, that he is in name and fact *servus servorum*. Now in the scientific community there is no pope, but there are many high priests. The scientific community is a democratic organisation, not a hierarchic one. Its high priests are just

those members of the community who have themselves done most to forward the progress of their science. Every high priest of geography, as of every science, is, in quite a literal sense, a slave of every investigator who is working in that particular field, or a related one. The organisation of research and the system of inter-communication are so arranged that the tasks beyond the strength and the problems beyond the power of the ordinary members of the community are continually being collected and automatically delivered at the workshop of this or that high priest. His workshop is usually a small room with a few books and maps. Here, without fee or charge, he completes the unfinished tasks and solves the harder problems. And hence he delivers the finished goods as a free gift to the community at large. He is fortunate indeed if he escapes without having himself to pay the cost of delivery. The reward of his office is harder work, less pay, and more criticism than that of the ordinary brothers. The high priest of geography, as of other sciences, is not differentiated by sartorial insignia, by definitive status, or by obsequious designation, but is generally recognisable by certain personal characteristics — by the world light that shines from his eyes, by the nobility of his countenance, by his threadbare coat, and usually, it must be confessed, by the baldness of his head. In the common phrase of every-day life he is known as an "eminent scientist"; in the jargon of his profession he is an "authority."

It is the real though unexpressed ambition of

every young scientist to become an "authority." In the many graduated stages towards this consummation there is one of special significance. If the young observer steadily continues his observations and interpretations, and faithfully compares his results with the records of science, he will find that he steadily progresses towards a climax. He will some day catch a moment or a mood, a phrase or a happening, in the fleeting movement of things, which will thrill him with an emotion intenser than any he has before experienced. He will instinctively feel that one of the secrets of the universe has been revealed to him and to him alone. Under the mysterious glow of an unforgetable enthusiasm he will feel his personality expand, until the self of his ego meets and touches in a sublime union the self of the world. In other words, he has been initiated into the fraternity of science, and for the first time he is, and feels himself to be, no longer a mere novice, but a full brother of the community.

It is clear we are here in the presence of a psychological phenomenon known in another walk of life as Conversion. In science it is known as the discovery of new truth. It may be a truth which is of the most trifling importance in relation to the total body of ordered knowledge which we call science. But the event is, in the life history of the individual scientist, one of most profound significance. It is, if not a turning-point in his career, yet an experience which will not be without its effect upon his whole future life. As is the way

of the older spiritual communities the event here, too, is celebrated by a particular ceremony of initiation. The scientific ritual of initiation has two well-marked stages. The first consists in the contribution of a memoir to the proceedings of the relevant society. The second consists of a copious baptism, in the form of a cold-water douche of criticism, from his brother scientists.

XX

If the foregoing analysis has suggested a fanciful analogy between religious and scientific experience, it has entirely failed in its purpose. The intention has been not to suggest an analogy, but to indicate an essential similarity, indeed, a partial identity of type. In the language not of psychology, but of sociology, the contention is that the scientific and religious groups are vitally related in their social origins and functions. Addressing an audience of biologists one would probably convey the intended impression by saying that science and religion are social organs which are in part both homologous and analogous. But the rightly discredited usage of biological terminology in social science prohibits recourse to that language. The argument is that science has its social as well as its logical and psychological aspects, and that from the former point of view a scientific society is manifestly to be classed amongst the social institutions. And that, moreover, in the wide and varied range of social institutions the place of a scientific society is, it is affirmed, alongside of the church. The

characteristics possessed in common by the religious and scientific community can be traced out in detail. If, for instance, the scientist resorts to a public library to read the journal of his favourite society, he is obviously paralleling the tendency of the laxer churchman to escape the monthly collection for what in certain nonconformist churches is called the sustentation fund. But minute detail and formal aspect apart, what is it that constitutes the essential similarity of type in the religious and scientific group?

The immense multiplication of religious sects in the present day, and in history, is popularly accounted one of the least creditable features of civilisation. The sceptics deprecate it as a bad habit, like alcoholism and immorality, into which the uncultivated man is prone to fall. But in itself, and apart from its secondary effects, the mere proliferation of sectionally religious bodies is simply an expression of spiritual freedom. In joining this, that, or the other church, in remaining within its fold, or in leaving it, the individual believes himself to be actuated by non-material motives. He believes that he is uninfluenced alike by the parliaments that make laws, the bureaucracies that administer them, and the judges that interpret or misinterpret them. He believes that his religious life is unconditioned by the policeman visible at the street corner, by the sovereign invisible on his throne, and the soldiers that display his royal uniform. In brief, the member of a religious community believes himself to have risen into a world

of spiritual freedom, untrammelled by the prohibition and compulsion which in civil history are called law and politics; in natural history, tooth and claw. How far this belief in a life of spiritual freedom is real, and how far it is illusory, matters not for the moment. The point of insistence is that the members of a religious community are bound together by similarity of ideas and feelings, and not by bonds which rest upon a potential recourse to physical force. In other words, the social influences immediately operative upon and amongst a religious community are mental, moral, and æsthetic. They are not legal and political. And in this respect at least it is sufficiently manifest that the scientific community resembles a religious one.

XXI

It is one of the merits of Comte to have aided the progress of thought by generalising under the one conception of Spiritual Powers all those agencies and institutions which influence men by mental, moral, and æsthetic considerations. His corresponding conception of Temporal Powers generalises agencies and institutions which operate on or influence conduct by an actual or potential recourse to physical force. The Spiritual Powers thus seek to substantiate or to modify belief—using that term in its broadest sense—having as their instruments ideas and emotions. Temporal Powers seek to determine conduct by using material rewards as impulse, and physical fear as deterrents.

The popular distinction between State and Church may be regarded as a particular case of the wider popular distinction between the Law and the Gospel; and this again is a particular case of the larger scientific generalisation of Temporal and Spiritual Powers. There are, of course, practical advantages which prompt the popular mind to extend its widening circles of general concepts, which again are further refined and developed by science. The general concept is to a mere collection of facts what regimentation is to a mob of men. It enables one to neglect individual eccentricities and predict the collective behaviour of the group, whether the group consists of items called facts or items called men. The inducement to widen the generalisation is, that the larger its scope the broader are the limits of prediction. The assumption made is that the process of generalisation is a gradual one, and that the steps from the concrete facts up to the largest generalisation are all traceable without a break. In other words, a generalisation must be of a kind which in science is called verifiable—that is to say, the prediction based upon it must refer to a course of future events, which must either happen or not happen at a given place and within a given and finite time. And this proviso of verifiability gives a definiteness and fixity to scientific generalisations, which is often absent from those alike of the popular mind or of the poetic imagination.

Science and Citizenship

XXII

There are those who tell us, that there is no proper science of society because there are no known sociological laws. Others go still further, and say that the nature of human society is such that no social laws are discoverable, that there is no science of human society, that sociology not only does not, but never will exist. This is a mode of argument well known to historians of scientific thought. It has been used at every epochal advance by the obscurantists to justify their ignorance and soothe their vanity. It belongs, in fact, to the self-protective devices so common everywhere throughout the organic world, and especially amongst the higher animals. Probably the most effective reply to this sort of criticism is for the scientific observer to ignore it, and to continue without interruption his observations and generalisations of them. If those who tell us there are no laws in social science would say instead that they themselves do not know any such laws, we might be happy to agree with them. And if those who say there never can be any such laws would say instead that they themselves are determined never to know any such laws, we might reasonably leave them in possession of the ignorance to which they have pinned their faith, with such a noble assurance that it will last their time.

In point of fact, what generalisations, in the nature of scientific law, are there at the disposal of the sociologist who wishes to predict the future

of an incipient Spiritual Power? A full stock-taking of resources would here disclose a considerable number of working formulæ, which resume a vast mass of experience as to the origin, growth, and decay of various forms of spiritual power.

But for the present purpose the following generalisations especially serve, viz. :—

I. That Spiritual Powers in the course of their historical development gradually conceive and formulate a Social Ideal, and this Social Ideal tends to be in conflict with the existing Temporal Power.

II. That each Spiritual Power tends to develop two types of organised community—a type predominantly passive and contemplative, and a type predominantly active and militant.

III. That the active type of Spiritual community endeavours to generate a congruent form of Temporal Power as the material embodiment and mundane expression of its particular Social Ideal.

IV. That in this endeavour various institutions are developed, which help to determine each era of city development, both in respect of buildings and of civic policy.

XXIII

The conflict and interaction between temporal and spiritual ideals in the history of Western Europe during the Christian period is, of course, one of the commonplaces of social discussion. But the detailed influences and reactions, especially on city development, of the respective ideals

of the Law and the Gospel have not been sufficiently worked out. The system of feudal law, which still encrusts occidental civilisation, has its animating principle in the mediæval maxim, *nulle terre sans seigneur*, which might be conveniently translated as, in the social sense, *No spot without its despot;* and in the civil sense, *No foot of soil without its functionary.* The contrast of these ideals with that of Christian ethics—the kingdom of God is within you—is sufficiently obvious. But what the student of city development has to do, is to decipher and work out the expression and interaction of these conflicting ideals in each successive phase of civic architecture and civic policy. Thus, for instance, in the case of London the sociologist is to see how the Tower and Windsor Castle are the expression and embodiment of certain political ideals, and he is to trace throughout the history of London the influences and ramifications of the Tower and the Castle, and follow their line of direct descent down to the existing institutions which are their functional analogue—these presumably being the contemporary Functionary-factories of Whitehall. In the same way, he is to see how Westminster Abbey and St. Paul's are the culminating expression and embodiment of certain spiritual ideals; and their influence and reaction on civic life and architecture is likewise to be traced through successive stages of city development, and the analogous types of institutions to-day have to be discovered and described alike in their structural

and functional aspects. And every city has for the sociologist its corresponding problems of factual observation, of historical analysis, and of scientific interpretation. All these again, to be sure, assume their place as specialist researches within the larger problems of general sociology.

Now, if we apply the four-fold sociological formulæ above indicated to the present and future phases of science, considered as a spiritual power, what inferences may we legitimately draw? The existing groups of science, whether or not organised in definite societies, are comparable, we have seen, to the various sects of the religious community. Now these numerous and varying sects, like their more archaic religious types, have their rivalries, jealousies, feuds and bickerings. The mathematicians, for instance, are apt to form an exclusive caste apart, holding no converse with groups which know not their particular shibboleths. Again, the spectacle might have been seen, at a recent meeting of the British Association, of rival biological factions warmly anathematising each other. A momentous and historic instance of scientific sectionalism is seen in a work now in progress, which is probably the largest co-operative enterprise yet undertaken by modern scientists. A few years ago the Royal Society convened in London a great gathering—a sort of Council of Trent—of scientific fathers, representing all the leading academies and societies of Europe and America. The purpose of this great gathering was to decide upon an authorised canon of the

sacred texts. A momentous decision was reached. It was concluded that a sufficient degree of traditional sanctity did not attach to the writings of the economists, the psychologists, the sociologists, and some other orders. The writings of these were accordingly omitted from that authorised canon, which is now in course of actual compilation under the title of "The International Catalogue of Scientific Papers." It is clear from these evidences of internal disruptiveness, that science as a whole does not at the present moment possess that cohesiveness and unity of aim which are vital to a period of demiurgic spiritual effort.

XXIV

On the evidence of internal disintegration one would infer that science has either passed, or has not yet reached, its constructive synthetic era. But are there not signs around us which point to a coming and even incipient period, in which science will develop its doctrine of human life as a great spiritual power? The clearest notes in this scientific chord which is beginning to sound are perhaps the geographical and the biological ones.

We have seen how the geographer, no longer merely interpreting the present by the aid of the past, is beginning to have visions of the future. In seeing the city as the realisation of regional potencies, he cannot but feel also an ideal impulse towards organising the city as an optimum adaptation of the regional environment to human life.

The geographer's social ideal is indeed in process of explicit formulation, and that on many sides. And in its application to a particular city, the most notable perhaps of these formulations may be found in one of the books indicated for reading in connection with this paper. It is Professor Geddes' "City Development." Here indeed the ideal of city development is by no means confined to that of the geographer, but the civic policy here enunciated has its definite starting-point in the geographer's vision of the city. And other similar initiatives are visible in many different directions. The Garden City movement is essentially geographical in its point of departure from traditional civic policies. And the same may be said of Mr. H. G. Wells' Utopist writings (in which the biological note is also sounded); and indeed of all those who advocate a certain ruralisation of the city, whether by the development of parks and gardens, or by other means. However much all these differ from one another in other points, they agree in their emphasis and insistence on a better regional adaptation to city life. It is clear in fact that we are here in the presence of a movement towards an Applied Geography. The division of science into pure and applied is a familiar one up to a certain point, but we may more readily apprehend its significance, if we view it as comparable to the distinction between the Regular and the Secular orders in religious communities. Like the Regular orders, the cultivators of pure science concern themselves mainly with doctrine, while the applied scientists,

like the Secular orders, have their main interest in the application of doctrine to the needs of daily life.

XXV

Amongst existing groups of scientists which are the Seculars, which the Regulars? In the Physical Sciences it is easy to recognise actual or incipient Regular orders, in mathematicians, in students of heat, light, electricity, chemistry, &c. On the practical side there is the great body of engineers, with its numerous subdivisions, there are manufacturing chemists, the brewers, the opticians, &c.—are these the Secular orders in the physical group? Before answering that question we must discriminate. The differences of type are very great. It is, for instance, a far cry from the stoker, or even the driver, of a coal engine at the one end of the scale, to, at the other, the active partner in the firm of Messrs. White & Co., electricians and instrument makers; for the active partner in that firm is, or was, Lord Kelvin. It will be urged that Lord Kelvin as instrument maker and electrical engineer is merged and sunk in Lord Kelvin the professor, the investigator, the theorist. But the opposite interpretation would be equally true and equally false. The essential point is to see that it is the very coincidence and alternation of theory and practice, of science and art, of thought and action, that above all, differentiate and mark off the Seculars of science from those of other varieties of Spiritual Power. And applying this distinction, we readily

recognise that the great majority of engineering occupations do not really belong to science at all in the proper sense, but are persistent survivals of a pre-scientific age. The empirical rule-of-thumb types of engineer are still predominant, but they essentially belong to a pre-scientific order that has been well called Palæotechnic. They do not possess the physicist's vision of the world, still less therefore do they seek to apply it to life. The physical scientist in his cosmic mood sees the world as an automatic system of energies, with a tendency to run down and without a discoverable means of winding it up again; while as to the why and wherefore of its being originally set going, the data of his science give him no clue. Looking at the same phenomena in his humanist mood, he sees the flux and transformation of forces take on and assume a definite design and purpose, which the very logic of his science compels him to postulate as an inherent potency in the very system of energies. He sees every form of energy a potential slave of man. He sees the cities scattered over the face of the globe, as the supreme, the collective, the ceaseless effort of the race to realise this potency of energy, to harness it in the service of man. The type of physical scientist in whom the cosmic mood is habitual and dominant is the actual or incipient Regular. But where the grand and inspiring ideal of realising for man the potency of world energies animates the physical scientist, there clearly we have the possibility of great Secular orders. And that such orders are everywhere incipient and

rapidly developing, there are many evidences to show. These evidences are vividly depicted in the sociological writings of Mr. H. G. Wells, who more than any one else perhaps in the English-speaking world has seen, or at least expressed for us in literature, the incipient changes in city development which are being effected by these new Secular orders of applied physical science.

The new type of engineer is tending more and more to assume control of the communications of our cities, their factories and workshops, the great public works of water supply, lighting, drainage, &c. And thus gradually determining for us the material conditions of life, the new engineer acquires social status and prestige. And in pursuance of the well-known sociological law, that those who have social power tend also to get civil and political power, we are bound to assume that the engineer types, as they are already tending to control civic policy, will sooner or later seek to control national and even world policy. And that these higher aspirations are already well on the way towards achievement is seen in the influence now being exercised by the railway kings of America, not only in their own country but also in world politics. With the advantages brought about by the activities of these new Secular orders, there are of course corresponding disadvantages. The conception of a city held by the railway engineer is, we have already seen, not that of a city at all, but that of a town. And this limitation applies throughout the whole sphere of thought and action belonging to this

phase of life. It manifests itself even in Mr. Wells' Utopist pictures of the cities of the future. For in these idealist cities, is it not the case that the inhabitants, notwithstanding their manifold cultural activities, have still their main interests in the material aspects and conditions of things. Are they not, in fact, townsmen first and only citizens thereafter ?

XXVI

If the foregoing criticism is a just one, the cause of the limitation is doubtless to be sought in some arrestment of normal scientific development. The physical scientist who remains such falls a long way short of repeating and resuming the normal racial development. For above and beyond the physical group of sciences, the race has conquered or is conquering for science higher domains. Immediately above the physical sciences is the biological group. Here, who are the Regulars and who the Seculars ? It is not difficult to see the regular type in anatomist and taxonomist, in physiologist and œcologist, in embryologist and palæontologist, in ontogenist and phylogenist. These, or some of them, are doubtless strange names, unfamiliar to the public, even to that small section of the public which enjoys a classical culture. But the groups of scientists thus characterised nevertheless exist, and that moreover in growing numbers and influence, all over the western world. They are organised into bodies

which are essentially Regular orders of an incipient Spiritual Power, and as such they are silently preparing a great moral revolution. Where are we to look for the Secular orders who will be their active instruments of temporal change? The occupations concerned with the biological or organic side of civilisation are, of course, those of peasant and farmer, of gardener and stock-raiser, along with medical doctors and surgeons, not to mention the herbalists and the nurses, the barbers and the hairdressers, the gymnasts and all the lower and older groups of occupations, from and through which the medical profession has risen to its present summit. Which amongst all these are the Secular orders of science, and which the empirical survivals of a pre-scientific age? To answer that, we must first ask what is the special vision of the world which animates the biologist? and further, we must ask what militant groups are there whom this vision stimulates into practical activity? The biologist, like other scientists, has his cosmic and his humanist mood. In the former he sees an endless chain of developing life beginning he knows not how or why, and tending he knows not whither. In his humanist mood he sees the same unbroken chain that links together the whole series of organic beings; but now sees in it evidence at every point, from lowest to highest, of the promise and the potency of a supreme culmination. And in the most beautiful and noblest of human beings he sees a form which, by taking thought, the whole race may reach and surpass.

To the biologist the city is thus no mass of mere inorganic structures, but a group of organic beings which individually pass away but racially abides, continues and develops towards a definite ideal or degenerates to its opposite. And the ideal of the city is therefore to the biologist the full realisation of racial potency. Who amongst biologists are stimulated into activity by this vision of civic potency? Increasingly large numbers of the medical profession are animated by the ambition of preventing rather than curing diseases. The noblest instances of missionary enterprise are paralleled by the self-sacrificing adventures and exploits which daily engage the lives of the enthusiasts of the newer medicine. The missions that go out from the Pasteur Institute in Paris to study (say) typhoid fever in Brazil, or from the Institute of Tropical Medicine in Liverpool to investigate (say) yellow fever in New Orleans, are merely conspicuous instances of a heroic activity that is normal in that increasing wing of the medical profession beginning to be called the hygienists. Of these many are already organised into large and well-established Secular orders, such as the various institutes of public health, sanitation, &c., to be found in every large city. Others, less directly but still more vitally, are beginning to influence both civic and national policy through great institutions of the more regular type of order, such as the Pasteur Institute, and similar organisations incipient elsewhere.

Science and Citizenship

XXVII

A new Secular order of biologists is beginning to appear in the Eugenists, who seek to develop and apply Mr. Francis Galton's doctrine of Eugenics. It belongs to this doctrine to rescue the "perfect man" from the lumber of archaic survivals, and restore it, not as an idol of a Golden Past, but as a legitimate ideal of the future. Taken over from theology by political philosophers of the eighteenth century, the idea of the Fall of Man from a state of primordial perfection became a powerful solvent of economic and political institutions. An abortive and premature attempt was then made by early biologists and sociologists to use the doctrine as a constructive ideal by transforming it into the conception of a future perfectibility of type. But in the generation which witnessed the classic demonstration of organic evolution by Spencer and Darwin, by Haeckel, Wallace, and Galton, the very idea of perfectibility was discredited. Nevertheless the language of the Fall persisted, and of necessity had its unconscious influence on thought. It was therefore quite natural, if not inevitable, that the place of Man in the animal series should be worked out in terms of descent and not ascent. But the idea of potency latent in organic evolution was bound to manifest itself.

It was Francis Galton who first and most fully made the change from the cosmic and naturalist to the humanist and idealist mood in organic evolution. His doctrine of Eugenics shifts the

centre of interest in Man's pedigree from the Past to the Future. Actually and in point of fact the worst bred of animals, Man has become so, because he of all animals has the highest potency for degeneration or for evolution. That is one of the truths revealed to us by evolutionary biology. The other is the legitimacy of aspiration towards a future ideal. But the ideal of evolutionary biology markedly differs from its pre-scientific anticipations. It is an ideal definable as starting from a known potency, and approximately realisable within finite space and time, and to be reached by ascertainable processes operating within discoverable limits. In short, the ideal of Eugenics has the scientific character of being a verifiable ideal and not an illusory one. It postulates an ideal type towards which we can definitely steer and certainly move with assured hope of approximately, but never actually, reaching it. For the ideal itself undergoes evolution, the very increase of evolutionary potencies and processes being itself the warrant of higher aspirations. Mathematicians express the relation of two paths always converging but never meeting by the word asymptotic. Originating outside the systems of professed philosophers, evolutionary idealism has yet its necessary relations to traditional doctrines of idealism and realism. Its place and correlation with these has yet to be worked out and defined. But meantime it may help towards establishing a point of contact with existing systems of philosophy to say that evolutionary ideals express an asymptotic reality.

Science and Citizenship

XXVIII

The favourite recourse of the ill-informed members of a community to escape the penalties of nescience, is to normalise their own defects and to postulate a universal ignorance. This protective device of the cunning animal is nowhere more frequent than in discussions of the problem of heredity. It is frequently asserted that we know nothing at all of heredity with precision and certainty. It is quite true the biologists and psychologists have a great deal still to learn about heredity. But it is equally true that they have a great deal to teach. And the citizen as well as the student can only escape the charge of hopeless obscurantism by promptly putting himself to this school. One of the first things he will learn is the deep significance and the practical importance of the distinction between organic inheritance and social inheritance. The former is concerned with the heritage that comes to us in organic descent from our family stock, *i.e.* the pre-natal influences which condition our life. The latter is concerned with the qualities and aptitudes that come to us through training and education, through tradition and experience—in a word, through the post-natal and therefore social influences that condition our life. Small or great as may be the ordered and verified knowledge accumulated by the students of organic inheritance, there can be no question of the mere massiveness and quantity of our knowledge of

social inheritance and social variation—in a word, of social evolution. Where is all the knowledge to be found? Who are its guardians and continuators? Are they not called historians and economists, political philosophers and comparative jurists, anthropologists and folk-lorists, psychologists and æstheticists, students of ethics and of comparative religion? Are not all the foregoing of the nature of Regular orders engaged in studying the various aspects of our social heritage of industry and commerce, of law and morals, of religion and art, of language and literature, of science and philosophy? If they are not, who and where are the Regulars of Social Science? who and where the Seculars? Occupied on the practical side of our social life are the merchants and the manufacturers, the politicians and the lawyers, the journalists and orators, the artists and literary men, the teachers and professors, the moralists and priests. Which amongst all these are the Seculars of Social Science? which the persistent survivals of the pre-scientific ages?

XXIX

To answer these questions we must ask what vision is seen by psychologist and sociologist in their cosmic or naturalist mood, and what in their humanist mood? What potencies do they see in social evolution, in city development? What groups (if any) of more militant type are inspired by these visions of social potency, to

work towards the realisation of the corresponding ideals? In reply, little can be said at the close of an already prolonged paper. The sociologist in his naturalist mood sees the city as successive strata of wreckage and survivals of past phases in the endlessly-changing antics of a building and hibernating mammalian species. In his humanist mood he sees—somewhat dimly, it must be confessed—the city as the culminating and continuous effort of the race to determine the mastery of its fate, to achieve a spiritual theatre for the free play of the highest racial ideals. In short, the cities of the world are in this view but processes of realising the spiritual potency of the human race. They are the true homes of Humanity. And it is just here that science — whose mission it is to fulfil, and not to destroy—reveals to us the germ of truth in the popular sentiment, which insists that the essential characteristic of the city resides in the University and the Cathedral. The truth, to be sure, is that it is the presence of functional institutions of the highest spiritual type, whether or not we call them University and Cathedral, that differentiates the city from the town. It follows that the civic policy of our Secular sociologists—if we have any—must be concerned with the city as itself a cultural potency, and with the whole body of citizens as individuals responsive to the creative influences of the spiritual ideals, active or latent, in drama and poetry, in art and music, in history and science, in philosophy and religion. The most comprehensive,

abstract, and general statement of culture policy from the sociological standpoint still probably remains that made more than half a century ago by Comte in the "Positive Polity," which was really the Utopia of his later thought, educated and matured by the preliminary preparation of the "Positive Philosophy." Fortunately, the four massive volumes of his "Positive Polity" were condensed and summarised by Comte himself, and the contentious elements for the most part omitted, in the single small and cheap volume translated by Dr. Bridges as a "General View of Positivism." Ranking with Comte's statement of culture policy in its comprehensiveness of outlook and far-sighted vision, but written from the standpoint of contemporary science, and therefore appropriately detailed and concrete in reference, here and now, in plan and section and perspective, to a particular city, is Professor Geddes' recent book, "City Development," already cited for its geographical vision, and now for its sociological ideals. These two books, from their different but correlated standpoints, express a doctrine whose isolated elements are everywhere recognisable. It is evident, therefore, that the life out of which the doctrine is fermenting is in active growth. If, then, they are not already here, we may be sure that the Sociological Friars are coming.

Science and Citizenship

List of Books for Reading and Reference.

I.

1. "Life and Labour of People in London." Charles Booth. (Macmillan.)
2. "Poverty." Seebohm Rowntree. (Macmillan.)
3. "Housing Conditions of Manchester and Salford." T. R. Marr. (Manchester.)
4. "The Example of Germany." T. C. Horsfall. (Manchester University Press.)

II.

1. "Anticipation." H. G. Wells.
2. "Mankind in the Making." H. G. Wells.
3. "A Modern Utopia." H. G. Wells.
4. "To-morrow: A Scheme of Garden Cities." Ebenezer Howard.
5. "City Development." Patrick Geddes. (Edinburgh, and St. George Press, Bournville.)

III.

1. "General View of Positivism." A. Comte. Translated by Dr. Bridges. (Reeves & Turner.)

IV. Periodicals.

1. *La Science Sociale.* Edited by E. Demolins.
2. Sociological Papers, published annually by Macmillan for the Sociological Society, 5 Old Queen Street, Westminster, S.W. (*Vide* especially vols. i. and ii., articles on 'Eugenics' by Mr. Francis Galton, and on "Civics" by Professor Geddes.)

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